

PCT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 01 February 2001 (01.02.01)	
International application No. PCT/US00/16064	Applicant's or agent's file reference 19141.0035P1
International filing date (day/month/year) 12 June 2000 (12.06.00)	Priority date (day/month/year) 11 June 1999 (11.06.99)
Applicant SAMUELS, Mark, A. et al	

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

04 December 2000 (04.12.00)



in a notice effecting later election filed with the International Bureau on:

2. The election



was



was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Pascal Piriou Telephone No.: (41-22) 338.83.38
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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 19141.0035P1	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 00/ 16064	International filing date (day/month/year) 12/06/2000	(Earliest) Priority Date (day/month/year) 11/06/1999
Applicant SPECTRX, INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☒ **Certain claims were found unsearchable** (See Box I).

3. ☒ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

ALIGNMENT DEVICES AND METHODS FOR FLUID EXTRACTION FROM TISSUE AND SUBSTANCE DELIVERY

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1A



None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/16064

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 32-40
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-5 14-16 and 41

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus and further comprising an energy absorbing layer.

2. Claims: 1, 6-13

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus further comprising means (clip, male-female member, magnet, thread) for mating with a surface on the apparatus

3. Claims: 1, 17-20 and 42

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus and an energy emitter apparatus comprising an alignment member for mating with the tissue interface member

4. Claims: 1, 21, 22 and 23-31

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus and a tissue breaching device comprising an alignment member for mating with the tissue interface member

INTERNATIONAL SEARCH REPORT

International Classification No.

PCT/US 00/16064

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61B10/00 A61B19/00 A61B5/00 A61K41/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61B A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 274 418 A (VESTERAGER PETER K R ET AL) 23 June 1981 (1981-06-23)	1,13-16, 41
Y	column 3, line 56 -column 4, line 48; figures 4-6	2-5
Y	--- US 5 885 211 A (EPPSTEIN JONATHAN A ET AL) 23 March 1999 (1999-03-23) cited in the application column 15, line 6 - line 38 column 16, line 42 -column 17, line 50 column 32, line 54 -column 33, line 9; figures 1,3A,4,28 column 32, line 54 -column 33, line 9 column 41, line 28 - line 50; figure 28 --- -/--	2-5,22, 25-28, 31,42

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

10 January 2001

Date of mailing of the international search report

19.01.2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Moers, R

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 90/16064

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 90 04354 A (HON EDWARD H ;HON EDWARD D (US); HON ROBERT W (US)) 3 May 1990 (1990-05-03) abstract; figures 1-5 ---	1,14-16
X	US 5 556 372 A (URGOVITCH KENNETH J ET AL) 17 September 1996 (1996-09-17) Y abstract; figure 2 column 7, line 6 - line 58; figures 2,13 ---	1,15, 17-20 42
X	US 5 879 373 A (BOECKER DIRK ET AL) 9 March 1999 (1999-03-09) Y column 8, line 41 - line 49; figure 1A ---	1,6-11 12,22, 25-28,31
Y	US 4 112 941 A (LARIMORE FRANK C) 12 September 1978 (1978-09-12) column 3, line 63 -column 4, line 28; figure 3 ---	12
A	US 4 025 964 A (OWENS LESTER J) 31 May 1977 (1977-05-31) abstract; figure 1 ---	12
A	DE 198 24 036 A (ROCHE DIAGNOSTICS GMBH) 2 June 1999 (1999-06-02) column 3, line 15 - line 18 ---	12
X	WO 98 56293 A (MINIMED INC) 17 December 1998 (1998-12-17) page 7, paragraph 3 -page 8, paragraph 3 page 10, paragraph 2 -page 11, line 41; figures 1,2 -----	1,21,23, 24,29,30

INTERNATIONAL SEARCH REPORT

Information on content family members

Inventor: Application No

PCT/US 00/16064

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4274418 A	23-06-1981	DK 239876 A CH 616329 A DE 2724461 A	02-12-1977 31-03-1980 22-12-1977
US 5885211 A	23-03-1999	US 5458140 A US 5445611 A US 6142939 A AU 707065 B AU 6863196 A BR 9610012 A CA 2199002 A,C CN 1195276 A EP 0858285 A GB 2307414 A,B HK 1009321 A JP 11511360 T NO 980878 A WO 9707734 A US 5722397 A US 6018678 A	17-10-1995 29-08-1995 07-11-2000 01-07-1999 19-03-1997 21-12-1999 01-03-1997 07-10-1998 19-08-1998 28-05-1997 28-05-1999 05-10-1999 27-04-1998 06-03-1997 03-03-1998 25-01-2000
WO 9004354 A	03-05-1990	US 4947865 A AU 4484089 A CA 2000698 A EP 0439514 A JP 4501224 T	14-08-1990 14-05-1990 17-04-1990 07-08-1991 05-03-1992
US 5556372 A	17-09-1996	AU 717030 B AU 1883695 A CA 2212230 A CN 1175194 A EP 0809470 A FI 973331 A JP 8238284 A NZ 281871 A WO 9625112 A	16-03-2000 04-09-1996 22-08-1996 04-03-1998 03-12-1997 13-10-1997 17-09-1996 29-09-1999 22-08-1996
US 5879373 A	09-03-1999	DE 4446721 A DE 19522706 A EP 0722691 A JP 2807650 B JP 8215180 A	27-06-1996 02-01-1997 24-07-1996 08-10-1998 27-08-1996
US 4112941 A	12-09-1978	NONE	
US 4025964 A	31-05-1977	NONE	
DE 19824036 A	02-06-1999	AU 2155699 A WO 9927854 A EP 1032307 A	16-06-1999 10-06-1999 06-09-2000
WO 9856293 A	17-12-1998	US 5954643 A EP 0987982 A	21-09-1999 29-03-2000

RECEIVED

INTERNATIONAL COOPERATION TREATY

AUG 21 1999

NEEDLE & ROSENBERG

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

FLOAM, D., Andrew
Needle & Rosenberg, P.C.
The Candler Building, Suite 1200
127 Peachtree Street, N.E.
Atlanta, GA 30303-1811
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year) 10 August 2000 (10.08.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 19141.0035P1	
International application No. PCT/US00/16064	International filing date (day/month/year) 12 June 2000 (12.06.00)

1. The following indications appeared on record concerning:

☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative

Name and Address

FARQUHAR, David
4271 East Meadow Drive
Duluth, GA 30096
United States of America

DAF/mmd
DOCKETED
BY: gmm Date: 8/21/00
Reviewed: _____
Name / Date

State of Nationality

US

State of Residence

US

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address

FARQUHAR, J., David
4271 East Meadow Drive
Duluth, GA 30096
United States of America

State of Nationality

State of Residence

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☐ the elected Offices concerned
☐ the International Preliminary Examining Authority ☐ other:
The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Peggy Steunenberg

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

THOMSON, Paul A.
POTTS, KERR & CO
15 Hamilton Square
BIRKENHEAD, MERSEYSIDE CH41 6BR
GRANDE BRETAGNE

PCT

WRITTEN OPINION

(PCT Rule 66)

Date of mailing (day/month/year) 25.07.2001	
Applicant's or agent's file reference EB 5727	REPLY DUE within 1 month(s) from the above date of mailing
International application No. PCT/US00/16064	International filing date (day/month/year) 12/06/2000
Priority date (day/month/year) 11/06/1999	
International Patent Classification (IPC) or both national classification and IPC A61M37/00	
Applicant SPECTRX, INC. et al.	

1. This written opinion is the first drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:

I	<input checked="" type="checkbox"/> Basis of the opinion
II	<input type="checkbox"/> Priority
III	<input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input checked="" type="checkbox"/> Lack of unity of invention
V	<input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/> Certain document cited
VII	<input checked="" type="checkbox"/> Certain defects in the international application
VIII	<input type="checkbox"/> Certain observations on the international application
3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4. For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis. For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 66.2 is: 11/10/2001.

Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patendaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer / Examiner Moers, R Formalities officer (incl. extension of time limits) Dekker, M Telephone No. +31 70 340 4046
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WRITTEN OPINION

International application No. PCT/US00/16064

I. Basis of the opinion

1. With regard to the **elements** of the International application (Replacement *sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

Description, pages:

1-18 as originally filed

Claims, No.:

1-42 as originally filed

Drawings, sheets:

1/17-17/17 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of International preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

WRITTEN OPINION

International application No. PCT/US00/16064

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under Item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been and will not be examined in respect of:

☐ the entire international application,

☒ claims Nos. 32-40,

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the said claims Nos. 32-40.

2. A written opinion cannot be drawn due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

IV. Lack of unity of invention

1. In response to the invitation (Form PCT/IPEA/405) to restrict or pay additional fees, the applicant has:

☐ restricted the claims.

☒ paid additional fees.

WRITTEN OPINION

International application No. PCT/US00/16064

- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.
- 2. ☐ This Authority found that the requirement of unity of invention is not complied with for the following reasons and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees:
- 3. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this opinion:
 - ☒ all parts.
 - ☐ the parts relating to claims Nos. .

V. Reasoned statement under Rule 66.2(a)(II) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1. Statement
 - Novelty (N) Claims 1, 6-11, 13-18, 21, 23, 24, 29, 30, 41
 - Inventive step (IS) Claims 2-5, 12, 19, 22, 25-28, 31, 42
 - Industrial applicability (IA) Claims

- 2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims 32-40 relate to a method for surgery of the human body.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Subject 1: claims 1-5, 14-16 and 41.

1. The present application does not meet the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1, 14-16 and 41 is not new and the subject-matter of claims 2-5 does not involve an inventive step.

1.1 Document **US-A-4274418 (D1)** discloses (see Figs. 4 and 5) an alignment device comprising a tissue interface member for mating with an apparatus and having an adhesive element and a sensor as claimed in claims 1, 14, 16 and 41.

1.2 Document **US-A-5556372 (D2)** discloses (see Fig. 2) an alignment device comprising a strap as claimed in claims 1 and 15.

1.3 Document **US-A-5885211 (D3)** discloses a microporation system comprising an energy absorbing layer (see col. 15, lines 6-62; Fig. 1) as claimed in claim 2.

A skilled person, faced with the problem of improving the coupling of the light delivering system to the skin, would provide the system of D3 with a mating tissue interface member without using any inventive skill, such members being well known in the art of sensors applied to the skin (D1) and therapeutic treatment devices applied to the skin (D2).

Thus he would arrive at the subject-matter of claims 1 and 2.

1.4 Claims 3-5 do not contain any features which, in combination with the features of

any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, the reasons being as follows:

- claims 3 and 4: see D3, col. 16, lines 35-41;
- claim 5: D3 discloses the use of different sensors (see examples 23 and 24) for detection of an analyte, it would be an obvious modification to let such a sensor mate with the same tissue interface.

Subject 2: claims 1 and 6-13.

1. The present application does not meet the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1, 6-11 and 13 is not new and the subject-matter of claim 12 does not involve an inventive step.

1.1 Document **US-A-4274418 (D1)** discloses (see Figs. 4 and 5) an alignment device comprising a tissue interface member 12 having a threaded member as claimed in claims 1 and 13.

1.2 Document **US-A-5879373 (D4)** discloses (see Fig. 1A) an alignment device comprising a tissue interface member 20 having mating clip means 26 as claimed in claims 1 and 6-11.

1.3 It would be obvious for the skilled person to provide the device of D4 with magnetic connection means as an alternative to the clip means. Such magnetic connectors being well known in the art, see for instance **US-A-4112941 (D5)**. Therefore, the subject-matter of claim 12 lacks inventive step.

Subject 3: claims 1, 17-20 and 42.

1. The present application does not meet the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1, 17 and 18 is not new and the subject-matter of claims 19 and 42 does not involve an inventive step.

1.1 Document D2 discloses (see Fig. 2) a tissue interface member 102 mating with an energy emitter apparatus 14 further comprising a sensor and controller for detecting when the apparatus is in place (see col. 7, lines 49-58), as claimed in claims 1, 17 and

18.

1.2 It would only be a minor obvious modification to use a pressure sensor (claim 19) instead of electrically connected lugs of D2 to detect if the energy emitting device is in place, pressure sensors being well known in the art.

1.3 Document D3 discloses (see col. 41, lines 28-50):

An energy emitter apparatus comprising:

an energy source (see col. 41, line 36) for emitting energy suitable for absorption by an energy absorbing layer (see col. 41, lines 30 and lines 40-42) positioned in substantial contact with a surface of a tissue; and

at least one means for holding in place (see col. 41, lines 36-38) the energy emitter with respect to a tissue interface member (see col. 41, lines 33-35).

The skilled person knows that the alignment member of D2 is a suitable "holding in place means" to be used with D3 for mating the emitter and the interface member. Thus he would arrive at the subject-matter of claim 42 without using inventive skill.

2. It would seem that the subject-matter of claim 20 meets the requirements of Article 33 PCT. There is no indication in the prior art to use an extra switch to enable activation of the emitter only when the switch is closed in order to ensure maximum safety for the patient.

Subject 4: claims 1, 21, 22 and 23-31.

1. The present application does not meet the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1, 21, 23, 24, 29 and 30 is not new and the subject-matter of claims 22, 25-28 and 31 does not involve an inventive step.

1.1 Document **WO-A-9856293 (D6)** discloses (see Figs. 1 and 2) an alignment device comprising a tissue interface member 20, a tissue breaching device 14, 80 and a mating sensor device 12 as claimed in claims 1, 21, 23, 24, 29 and 30.

1.2 Document D3 discloses (see col. 18, line 20 - col. 19, line 28; Figs. 4-6):

An alignment device 140 comprising:

a tissue interface member (pads contacting the skin 160, 198);
a heatable element 148, 186 for breaching the tissue surface; wherein the alignment device comprising the heatable element is connected to the tissue interface member.

A skilled person, faced with the problem of improving the coupling of the heatable tissue breaching device of D3 to the skin, would provide the device of D3 with a corresponding mating tissue interface member and tissue breaching alignment member without using any inventive skill, such members being well known in the art of sensors applied to the skin (D1, D4) and therapeutic treatment or tissue breaching devices applied to the skin (D2, D6).

Thus he would arrive at the subject-matter of claim 22 without using inventive skill.

1.4 Dependent claims 25-28 and 31 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:

- claims 25-28: see D3, col. 15, lines 6-62;
- claim 31: see D3, col. 45, lines 7-18.

Re Item VII

Certain defects in the international application

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned. In the description, nor are these documents identified therein.
2. Independent claims 1, 23, 41 and 42 are not in the two-part form in accordance with Rule 6.3(b) PCT.
3. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 19141.0035P1	FOR FURTHER ACTION <small>see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</small>	
International application No. PCT/US 00/ 16064	International filing date (day/month/year) 12/06/2000	(Earliest) Priority Date (day/month/year) 11/06/1999
Applicant SPECTRX, INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☒ **Certain claims were found unsearchable** (See Box I).

3. ☒ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

ALIGNMENT DEVICES AND METHODS FOR FLUID EXTRACTION FROM TISSUE AND SUBSTANCE DELIVERY

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1A

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/16064

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 32-40
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-5 14-16 and 41

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus and further comprising an energy absorbing layer.

2. Claims: 1, 6-13

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus further comprising means (clip, male-female member, magnet, thread) for mating with a surface on the apparatus

3. Claims: 1, 17-20 and 42

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus and an energy emitter apparatus comprising an alignment member for mating with the tissue interface member

4. Claims: 1, 21, 22 and 23-31

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus and a tissue breaching device comprising an alignment member for mating with the tissue interface member

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 00/16064

A. CLASSIFICATION OF SUBJECT MATTER		
IPC 7	A61B10/00	A61B19/00 A61B5/00 A61K41/00
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC 7 A61B A61K		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 274 418 A (VESTERAGER PETER K R ET AL) 23 June 1981 (1981-06-23)	1,13-16, 41
Y	column 3, line 56 -column 4, line 48; figures 4-6	2-5
Y	<p>--- US 5 885 211 A (EPPSTEIN JONATHAN A ET AL) 23 March 1999 (1999-03-23) cited in the application column 15, line 6 - line 38 column 16, line 42 -column 17, line 50 column 32, line 54 -column 33, line 9; figures 1,3A,4,28 column 32, line 54 -column 33, line 9 column 41, line 28 - line 50; figure 28 --- -/--</p>	2-5,22, 25-28, 31,42
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
<p>* Special categories of cited documents:</p> <p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p> <p>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>*G* document member of the same patent family</p>		
Date of the actual completion of the international search		Date of mailing of the international search report
10 January 2001		19. 01. 2001
Name and mailing address of the ISA		Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Moers, R

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 00/16064

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 90 04354 A (HON EDWARD H ;HON EDWARD D (US); HON ROBERT W (US)) 3 May 1990 (1990-05-03) abstract; figures 1-5 ---	1,14-16
X	US 5 556 372 A (URGOVITCH KENNETH J ET AL) 17 September 1996 (1996-09-17) abstract; figure 2 column 7, line 6 - line 58; figures 2,13 ---	1,15, 17-20 42
Y		
X	US 5 879 373 A (BOECKER DIRK ET AL) 9 March 1999 (1999-03-09) column 8, line 41 - line 49; figure 1A ---	1,6-11
Y		12,22, 25-28,31
Y	US 4 112 941 A (LARIMORE FRANK C) 12 September 1978 (1978-09-12) column 3, line 63 -column 4, line 28; figure 3 ---	12
A	US 4 025 964 A (OWENS LESTER J) 31 May 1977 (1977-05-31) abstract; figure 1 ---	12
A	DE 198 24 036 A (ROCHE DIAGNOSTICS GMBH) 2 June 1999 (1999-06-02) column 3, line 15 - line 18 ---	12
X	WO 98 56293 A (MINIMED INC) 17 December 1998 (1998-12-17) page 7, paragraph 3 -page 8, paragraph 3 page 10, paragraph 2 -page 11, line 41; figures 1,2 -----	1,21,23, 24,29,30

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/16064

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4274418	A	23-06-1981	DK 239876 A CH 616329 A DE 2724461 A	02-12-1977 31-03-1980 22-12-1977
US 5885211	A	23-03-1999	US 5458140 A US 5445611 A US 6142939 A AU 707065 B AU 6863196 A BR 9610012 A CA 2199002 A,C CN 1195276 A EP 0858285 A GB 2307414 A,B HK 1009321 A JP 11511360 T NO 980878 A WO 9707734 A US 5722397 A US 6018678 A	17-10-1995 29-08-1995 07-11-2000 01-07-1999 19-03-1997 21-12-1999 01-03-1997 07-10-1998 19-08-1998 28-05-1997 28-05-1999 05-10-1999 27-04-1998 06-03-1997 03-03-1998 25-01-2000
WO 9004354	A	03-05-1990	US 4947865 A AU 4484089 A CA 2000698 A EP 0439514 A JP 4501224 T	14-08-1990 14-05-1990 17-04-1990 07-08-1991 05-03-1992
US 5556372	A	17-09-1996	AU 717030 B AU 1883695 A CA 2212230 A CN 1175194 A EP 0809470 A FI 973331 A JP 8238284 A NZ 281871 A WO 9625112 A	16-03-2000 04-09-1996 22-08-1996 04-03-1998 03-12-1997 13-10-1997 17-09-1996 29-09-1999 22-08-1996
US 5879373	A	09-03-1999	DE 4446721 A DE 19522706 A EP 0722691 A JP 2807650 B JP 8215180 A	27-06-1996 02-01-1997 24-07-1996 08-10-1998 27-08-1996
US 4112941	A	12-09-1978	NONE	
US 4025964	A	31-05-1977	NONE	
DE 19824036	A	02-06-1999	AU 2155699 A WO 9927854 A EP 1032307 A	16-06-1999 10-06-1999 06-09-2000
WO 9856293	A	17-12-1998	US 5954643 A EP 0987982 A	21-09-1999 29-03-2000

REC'D 11 OCT 2001

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference EB 5727	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US00/16064	International filing date (day/month/year) 12/06/2000	Priority date (day/month/year) 11/06/1999
International Patent Classification (IPC) or national classification and IPC A61M37/00		
Applicant SPECTRX, INC. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 8 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 04/12/2000	Date of completion of this report 10.10.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Moers, R Telephone No. +31 70 340 2375 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US00/16064

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-19 as originally filed

Claims, No.:

1-42 as originally filed

Drawings, sheets:

1/17-17/17 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US00/16064

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 32-40.

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the said claims Nos. 32-40.

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

☐ restricted the claims.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US00/16064

- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.
- ☐ not complied with for the following reasons:
4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:
- ☒ all parts.
- ☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2-5, 12, 19, 20, 22, 25-28, 31, 42
	No:	Claims	1, 6-11, 13-18, 21, 23, 24, 29, 30, 41
Inventive step (IS)	Yes:	Claims	20
	No:	Claims	1-19, 21- 31, 41, 42
Industrial applicability (IA)	Yes:	Claims	1-31, 41, 42
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US00/16064

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims 32-40 relate to a method for surgery of the human body.

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Subject 1: claims 1-5, 14-16 and 41.

1. The present application does not meet the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1, 14-16 and 41 is not new and the subject-matter of claims 2-5 does not involve an inventive step.

1.1 Document **US-A-4274418 (D1)** discloses (see Figs. 4 and 5) an alignment device comprising a tissue interface member for mating with an apparatus and having an adhesive element and a sensor as claimed in claims 1, 14, 16 and 41.

1.2 Document **US-A-5556372 (D2)** discloses (see Fig. 2) an alignment device comprising a strap as claimed in claims 1 and 15.

1.3 Document **US-A-5885211 (D3)** discloses a microporation system comprising an energy absorbing layer (see col. 15, lines 6-62; Fig. 1) as claimed in claim 2.

A skilled person, faced with the problem of improving the coupling of the light delivering system to the skin, would provide the system of D3 with a mating tissue interface member without using any inventive skill, such members being well known in the art of sensors applied to the skin (D1) and therapeutic treatment devices applied to the skin (D2).

Thus he would arrive at the subject-matter of claims 1 and 2.

1.4 Claims 3-5 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, the reasons being as follows:

- claims 3 and 4: see D3, col. 16, lines 35-41;
- claim 5: D3 discloses the use of different sensors (see examples 23 and 24) for detection of an analyte, it would be an obvious modification to let such a sensor mate with the same tissue interface.

Subject 2: claims 1 and 6-13.

1. The present application does not meet the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1, 6-11 and 13 is not new and the subject-matter of claim 12 does not involve an inventive step.

1.1 Document **US-A-4274418 (D1)** discloses (see Figs. 4 and 5) an alignment device comprising a tissue interface member 12 having a threaded member as claimed in claims 1 and 13.

1.2 Document **US-A-5879373 (D4)** discloses (see Fig. 1A) an alignment device comprising a tissue interface member 20 having mating clip means 26 as claimed in claims 1 and 6-11.

1.3 It would be obvious for the skilled person to provide the device of D4 with magnetic connection means as an alternative to the clip means. Such magnetic connectors being well known in the art, see for instance **US-A-4112941 (D5)**. Therefore, the subject-matter of claim 12 lacks inventive step.

Subject 3: claims 1, 17-20 and 42.

1. The present application does not meet the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1, 17 and 18 is not new and the subject-matter of claims 19 and 42 does not involve an inventive step.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US00/16064

1.1 Document D2 discloses (see Fig. 2) a tissue interface member 102 mating with an energy emitter apparatus 14 further comprising a sensor and controller for detecting when the apparatus is in place (see col. 7, lines 49-58), as claimed in claims 1, 17 and 18.

1.2 It would only be a minor obvious modification to use a pressure sensor (claim 19) instead of electrically connected lugs of D2 to detect if the energy emitting device is in place, pressure sensors being well known in the art.

1.3 Document D3 discloses (see col. 41, lines 28-50):

An energy emitter apparatus comprising:

an energy source (see col. 41, line 36) for emitting energy suitable for absorption by an energy absorbing layer (see col. 41, lines 30 and lines 40-42) positioned in substantial contact with a surface of a tissue; and

at least one means for holding in place (see col. 41, lines 36-38) the energy emitter with respect to a tissue interface member (see col. 41, lines 33-35).

The skilled person knows that the alignment member of D2 is a suitable "holding in place means" to be used with D3 for mating the emitter and the interface member. Thus he would arrive at the subject-matter of claim 42 without using inventive skill.

2. It would seem that the subject-matter of claim 20 meets the requirements of Article 33 PCT. There is no indication in the prior art to use an extra switch to enable activation of the emitter only when the switch is closed in order to ensure maximum safety for the patient.

Subject 4: claims 1, 21, 22 and 23-31.

1. The present application does not meet the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1, 21, 23, 24, 29 and 30 is not new and the subject-matter of claims 22, 25-28 and 31 does not involve an inventive step.

1.1 Document **WO-A-9856293 (D6)** discloses (see Figs. 1 and 2) an alignment device comprising a tissue interface member 20, a tissue breaching device 14, 80 and a mating sensor device 12 as claimed in claims 1, 21, 23, 24, 29 and 30.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US00/16064

1.2 Document D3 discloses (see col. 18, line 20 - col. 19, line 28; Figs. 4-6):

An alignment device 140 comprising:

a tissue interface member (pads contacting the skin 160, 198);

a heatable element 148, 186 for breaching the tissue surface; wherein the alignment device comprising the heatable element is connected to the tissue interface member.

A skilled person, faced with the problem of improving the coupling of the heatable tissue breaching device of D3 to the skin, would provide the device of D3 with a corresponding mating tissue interface member and tissue breaching alignment member without using any inventive skill, such members being well known in the art of sensors applied to the skin (D1, D4) and therapeutic treatment or tissue breaching devices applied to the skin (D2, D6).

Thus he would arrive at the subject-matter of claim 22 without using inventive skill.

1.4 Dependent claims 25-28 and 31 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:

- claims 25-28: see D3, col. 15, lines 6-62;
- claim 31: see D3, col. 45, lines 7-18.

Re Item VII

Certain defects in the international application

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.
2. Independent claims 1, 23, 41 and 42 are not in the two-part form in accordance with Rule 6.3(b) PCT.
3. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
21 December 2000 (21.12.2000)

PCT

(10) International Publication Number
WO 00/76575 A3

(51) International Patent Classification⁷: **A61B 10/00**,
19/00, 5/00, A61K 41/00

(21) International Application Number: **PCT/US00/16064**

(22) International Filing Date: **12 June 2000 (12.06.2000)**

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:
60/138,738 11 June 1999 (11.06.1999) US
60/140,257 18 June 1999 (18.06.1999) US
60/207,677 26 May 2000 (26.05.2000) US

(71) Applicant (for all designated States except US): **SPECTRX, INC.** [US/US]; 6000A Unity Drive, Norcross, GA 30071 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SAMUELS, Mark, A.** [US/US]; 4400 Missendell Lane, Norcross, GA 30092

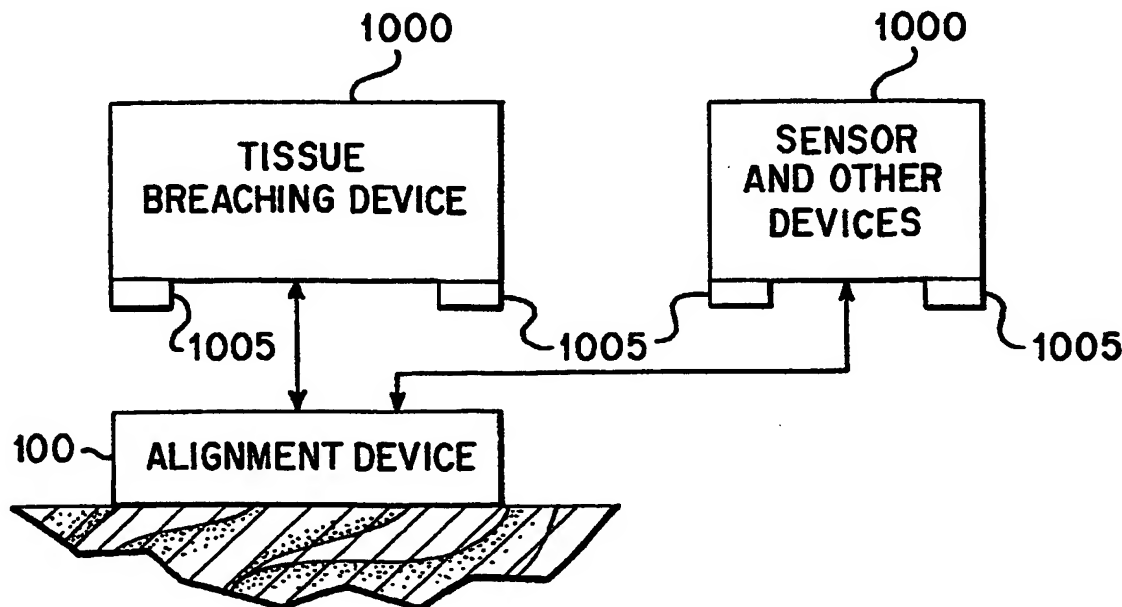
(US). **KUMAR, Krishna, S.** [US/US]; Apartment E, 1020 Court Drive, Tucker, GA 30084 (US). **ROBINSON, Garrett, T.** [US/US]; Apartment K, 1001 Oak Chase Drive, Tucker, GA 30084 (US). **FARQUHAR, J., David** [US/US]; 4271 East Meadow Drive, Duluth, GA 30096 (US). **CALAWAY, Allison** [US/US]; 5454 Glenridge Drive #703, Atlanta, GA 30342 (US). **WILLIAMS, Deidre** [US/US]; 1647 Mary Lou Lane, SE, Atlanta, GA 30316 (US). **HATCH, Michael, R.** [US/US]; 131 Price Hills Trail, Sugar Hill, GA 30518 (US). **SMITH, Alan** [US/US]; 736 Greenview Avenue, NE, Atlanta, GA 30305-2733 (US). **WOODS, Teresa** [US/US]; 1101 Tree Trail Parkway, Norcross, GA 30093 (US).

(74) Agents: **FLOAM, D., Andrew et al.**; Needle & Rosenberg, P.C., The Candler Building, Suite 1200, 127 Peachtree Street, N.E., Atlanta, GA 30303-1811 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO,

[Continued on next page]

(54) Title: **ALIGNMENT DEVICES AND METHODS FOR FLUID EXTRACTION FROM TISSUE AND SUBSTANCE DELIVERY**



(57) Abstract: An alignment device and related systems and methods for aligning at least one apparatus with respect to a surface of a tissue. The alignment device comprises a tissue interface member suitable for positioning on the surface of the tissue and mating with the apparatus to maintain alignment of the apparatus during an operation of the apparatus. The alignment device is useful to align various apparatus that are part of a continuous analyte monitoring system.



NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR,
TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

Published:

— *With international search report.*

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:

5 July 2001

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

**INTEGRATED ALIGNMENT DEVICES, SYSTEMS, AND METHODS FOR
EFFICIENT FLUID EXTRACTION, SUBSTANCE DELIVERY AND OTHER
APPLICATIONS**

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This application claims the benefit of U.S. Provisional Application No. 60/138,738 filed June 11, 1999, entitled Methods for Operating and Features of a Continuous Glucose Monitoring System, U.S. Provisional Application No. 60/140,257 filed June 18, 1999, entitled System and Method for Alignment of Micropores for
10 Efficient Fluid Extraction and Substance Delivery, and U.S. Provisional Application No. 60/207,677 filed May 26, 2000, entitled Integrated System Combining Alignment Ring and Thermal Ablating Dye that Simultaneously Removes from Alignment Ring with Optical Porator. The entirety of these above-mentioned U.S. Provisional applications is incorporated herein by reference.

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BACKGROUND OF THE INVENTION

Field of Invention

This invention relates to an alignment system and methods for aligning at least one apparatus with respect to a surface of a tissue by utilizing a tissue interface member
20 and mating the apparatus to the tissue interface member during the operation of the apparatus. Furthermore, this invention could have direct application in any situation where accurate, repeatable repositioning of one object with respect to another is needed, specifically for positioning an object on the surface of a tissue in a repeatable manner. For example, the coupling of any type of sensor, monitor, or device
25 (accelerometer, thermometer, pulse pressure monitor, electrode for sensing or delivering, etc.) could benefit from a reliable method of repositioning and guaranteed alignment. This invention may be used for either application of several of the same devices for comparison, or reapplication of the same device at prescribed intervals in time so long as the original tissue interface member can remain attached to the skin
30 unaffected.

Discussion of the Art

Previously, applications involving multiple or repeated engagement of an apparatus to a surface required hand-eye coordination for alignment. Often, this would lead to inaccurate alignment that would result in a less efficient and/or effective operation of the apparatus. The hand-eye coordination sometimes required a means for marking the desired location on the surface so as to use that marking as a reference point for subsequent alignment. However, this created a dependency on the operator that would lead to inconsistent results. In the field of continuous analyte monitoring of a biological tissue, oftentimes openings on the surface of the tissue are required to measure biological fluids. Techniques to create small openings in the tissue include the use of mechanical devices, thermal ablation and direct energy absorption. Where energy emitter devices are involved in the process, it is necessary to align the energy emitter device properly. For example, one thermal ablation technique creates openings utilizing a strip of energy absorbing film that is held in contact with the tissue. The film is responsive to energy directed thereon to heat up and to conductively transfer heat to the surface of the tissue to ablate the tissue. See, for example, U.S. Patent No. 5,885,211 for a further description of this thermal ablation technique.

Furthermore, in minimally invasive continuous analyte monitoring applications, the tissue ablation process creates openings to which vacuum can be applied to extract interstitial fluid or blood for measurement, or at which point a drug delivery device may be attached at the registration/poration site to deliver the desired drug through the openings. In situations where energy emissions are used to ablate the tissue, effective fluid collection, delivery and other handling processes can be hampered by the presence of the energy absorbing film. Moving the film out of the way for collection solves the interference problem, but then site registration for placement of the fluid extraction device and substance delivery device becomes an issue. This invention provides for a tissue interface member that maintains the desired alignment after removal of the dye layer so as to enable fluid extraction and substance delivery devices to operate at the desired registration site.

There is room for improving alignment methods, systems and devices where multiple apparatus and/or repeated apparatus application to a desired location on a surface is necessary and/or beneficial for effective use of an apparatus. Particularly in the area of continuous analyte monitoring, there exists a need to integrate and consolidate several functions of the analyte monitoring procedure into a single device. The present invention and its various embodiments accomplishes and satisfies this need by providing for an efficient means to make and maintain alignment of tissue breaching devices and sensors while also removing steps otherwise necessary for interfacing and operating those apparatus at the desired location on the surface of a tissue.

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SUMMARY OF THE INVENTION

The present invention is directed to an alignment device integrating a tissue interface member suitable for positioning at a desired location on the surface of the tissue and mating with an apparatus so as to maintain alignment of the apparatus during its operation. This device can be used with various types of apparatus. For example, when applied in a continuous analyte monitoring system, the apparatus may be an energy emitter device commonly used to thermally ablate the surface of the tissue. Other types of apparatus that may be used include devices such as those utilizing mechanical or heated wire techniques. In addition, alignment of devices such as a sensor that measures analyte concentration or a drug delivery device is also an important part of a monitoring system.

Systems and methods integrating the tissue interface member are also disclosed herein so that reliable and repeatable methods to properly center the desired apparatus may be applied. When applied to the field of continuous analyte monitoring, this integrated system allows for a poration mechanism to be applied and guarantees alignment as well as giving the user easy access to attach a device to the exposed adhesive site. In various embodiments of the invention, the tissue interface member adheres onto the skin and remains in its original position unaffected.

As will be evident by the following detailed description and the drawings herein, it will become apparent to one skilled in the art that the present invention and its

various embodiments can be applied to numerous other systems for which alignment or repositioning at a specific centered location on a surface for continuous or numerous measurements is desired.

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BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1A is a block diagram generally showing the environment of the alignment device according to the present invention.

Figure 1B is a block of an energy emitter apparatus having alignment features according to the present invention.

10 **Figure 1C** is a block diagram of an electrically heated element tissue breaching device having alignment features according to the present invention.

Figure 1D is a block diagram of a mechanical tissue breaching device having alignment features according to the present invention.

15 **Figure 1E** is a diagram of a fluid collection and sensor device having alignment features according to the present invention.

Figure 2A is a top view of a tissue interface member having biased clips according to one embodiment of the invention.

Figure 2B is a side view of the tissue interface member shown in **Figure 2A**.

20 **Figure 2C** is a view of the tissue interface member of the embodiment of the invention, as shown in **Figures 2A and 2B**, attached to an apparatus.

Figure 3 illustrates the tissue interface member according to another embodiment of the invention, mating with an apparatus having a complementary threaded surface.

25 **Figure 4A** is a top view of tissue interface member and energy absorbing layer according to another embodiment of the present invention.

Figures 4B and 4C show the side view of elements of the embodiment of the invention shown in **Figure 4A**.

Figures 4D and 4E illustrate the embodiment of the inventions as shown in **Figures 4A-4C**, inclusively, as used in a continuous analyte monitoring system.

Figure 5 is a perspective view of a tissue interface member and a portion of an apparatus that mates thereto, according to another embodiment of the invention.

Figure 6 is a side view of the tissue interface member according to another embodiment of the invention and mating with another apparatus.

5 **Figure 7A** is a top view of tissue interface member according to still another embodiment of the invention.

Figure 7B is a side view of the tissue interface member shown in **Figure 7A**.

Figures 8A through 8G are side views showing operation steps of a tissue interface member used as part of a continuous analyte monitoring system.

10 **Figure 9** is a diagram of a tissue interface member and an energy emitter device and illustrating a control activation feature according an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

15 **Definitions**

As used herein, the term "biological membrane" means the structure separating one area of an organism from another area of the organism, such as a capillary wall, or the outer layer of an organism which separates the organism from its external environment, such as skin, buccal mucosa or other mucous membrane. The term
20 "epithelial tissue, " when used herein is mean to mean skin, mucosa and linings of the body cavities of an organism.

As used herein, the term "tissue" means an aggregate of cells of a particular kind, together with their intercellular substance, that forms a structural material. The preferred tissue is the skin; however, other tissues suitable for use with this invention
25 include mucosal tissue and soft organs. These examples, as are other examples used throughout this specification, are for illustrative purposes only and are not intended to be inclusive of all possibilities or suitable uses.

As used herein, the term "suction" or "pressure" relates to the relative pressure as compared to the internal pressure of the organism to which the system is interfaced.

30 "Vacuum" is used synonymously with the term "suction."

As used herein, "ablation" refers to the process of controlled removal of a selected area of tissue from the surrounding tissue by kinetic energy released when the temperature of vaporizable substances in the selected area is rapidly elevated above the vaporization point thereby flash vaporizing some of the tissue in the selected area.

5 As used herein, the term "biological fluid" means blood serum, whole blood, interstitial fluid, lymph fluid, spinal fluid, plasma or any combination of these fluids. "Interstitial fluid" means the clear fluid that occupies the space between the cells in the body.

As used herein, "poration," "microporation," or any such similar term means the
10 artificial formation of a small hole, opening or pore to a desired depth in or through a biological membrane, such as skin or mucous membrane, or the outer layer of an organism to lessen the barrier properties of this biological membrane to the passage of biological fluids, such as analytes from within the biological membrane or the passage of permeants or drugs from without the biological membrane into the body for selected
15 purposes, or for certain medical or surgical procedures. The size of the hole or "micropore" so formed is approximately 1-1000 μ m in diameter. It is to be understood that the term "micropore" is used in the singular form for simplicity, but that multiple openings or pores may be formed by the integrated device according to the present invention.

20 As used herein, "opening" means any physical breach of the biological membrane of a suitable size for delivering or extraction fluid therethrough, including, but not limited to, micropores.

The term "porating element" is meant to include any means of forming a micropore, hole or opening described above, including by thermal ablation,
25 mechanically breaching the tissue by lancet or needle, and other known techniques. Several types of tissue breaching techniques, including thermal ablation methods, are disclosed in U.S. Patent No. 5,885,211. An example of a mechanical porator device is disclosed in commonly assigned published PCT Application WO 9800193, entitled, "Multiple Mechanical Microporation Of Skin Or Mucosa." Another porating technique
30 suitable for use in connection with this system is disclosed in commonly assigned PCT

Application No. PCT/US99/15967 entitled "Controlled Removal Of Biological Membrane By Pyrotechnic Charge For Transmembrane Transport," filed July 14, 1999.

The term "heated probe" or "heat conducting element" means a probe, preferably solid phase, which is capable of being heated in response to the application of electrical, mechanical, sonic, magnetic, electromagnetic or optical energy thereto for achieving thermal ablation of the tissue. For simplicity, the probe is referred to as a "heated probe" or "heatable probe" which includes a probe in a heated or unheated state, but which is heatable.

The term "continuously" when used in connection with a continuous analyte monitoring system, means acting on an ongoing basis at a frequency or event rate that may vary depending on a particular application of the system. For example, the output of the sensor may be read on a periodic basis, such as every minute, several minutes, hour, several hours, etc. Moreover, at each reading event the sensor output is optionally sampled multiple times so as to obtain a plurality of readings relatively close in time whereby an average or other adjustment of those multiple readings is made for determining a final reading that is displayed or logged. An example of a continuous monitoring system is disclosed in PCT Application No. PCT/US99/16378, filed July 20, 1999, and entitled System and Method for Continuous Analyte Monitoring.

The term "apparatus" means tissue breaching devices, such as an energy emitter device (laser), micro-lancets, micro-needles, and other mechanical tissue breaching devices, an electrically heated element device for performing thermal ablation as disclosed in U.S. Patent No. 5,885,211, a sensor device such as an analyte sensor (glucose, etc.), and a drug delivery device, or any other type of device used to interface with a surface of the biological tissue for the desired operation of the device.

The present invention is directed to an alignment device suitable for positioning on the surface of the tissue, preferably at a desired location on the surface of the tissue, and to systems and methods for using the alignment device. Referring to Figure 1A, the alignment device, shown generally at 100, is positioned, attached or placed on the surface of a tissue, such as skin. The alignment device 100 mates with apparatus 1000 that may be one of a variety of tissue breaching devices, sensors, etc. The apparatus

1000 include at least one alignment member 1005 that mates or engages with complementary alignment members of the alignment device 100.

Figures 1B through 1E illustrate examples of the various types of apparatus 1000 that mate with the alignment device 100, all of which may include any one or more of the specific alignment structures disclosed hereinafter. Figure 1B illustrates an energy emitter device 1010 comprising at least one energy source 1015, such as a laser. An example of a suitable laser device is disclosed in U.S. Patent No. 5,885,211. The energy source 1015 may be a type that is used together with an energy absorbing material, such as an optical energy absorbing dye film, to ablate tissue by thermal ablation. Alternatively, the energy source 1015 may be a type that is used to cause the direct absorption of energy to ablate the tissue. In either case, alignment to the tissue surface is achieved by providing at least one alignment member 1005 on the energy emitter apparatus that mates with the alignment device 100.

Figure 1C shows a heated element tissue breaching device 1042 comprising one or more electrically heatable elements 1045. Electrical current is supplied to the heatable elements 1045 from a current source 1047 under control of a controller 1050. Further details of the device 1042 are disclosed in U.S. Patent No. 5,885,211 and in PCT Application No. PCT/US99/04990, filed March 5, 1999. The device 1042 includes at least one alignment member 1005 to mate with the alignment device 100 and thereby properly aligns the elements 1045 with the tissue surface via the alignment device 100.

Figure 1D illustrates a mechanical tissue breaching device 1060 comprising at least one tissue piercing element 1062, such as a micro-lancet or micro-needle. The device 1060 has at least one alignment member 1005 to mate with the alignment device 100 and properly align the tissue piercing element 1062 with the tissue surface. The tissue piercing element 1062 may be retracted in the device 1060 when not in use, and released into the tissue by one of a variety of mechanisms known in the art, such as those used in glucose test kits. Alternatively, the device 1060 may comprise a plurality of tissue penetrating members fabricated using micro-lithographic techniques as described in aforementioned PCT Application No. WO 9800193.

Figure 1E illustrates basic components of a fluid collection and sensor device 1150. The device 1150 has at least one alignment member 1005 to mate with the alignment device 100 in order to position a harvesting head or opening 1155 with openings made in the tissue beneath the alignment device. The fluid collection and sensor device 1150 further comprises an assay element 1192 positioned in or proximate a fluid collection chamber 1190. The assay element 1192 is responsive to one or more substances in the fluid collected from the tissue, such as glucose. Fluid from the tissue is drawn into contact with the assay element 1192 under application of vacuum supplied via a cable 1194. The details of a suitable fluid collection and sensor device are disclosed in PCT Application Nos. PCT/US00/09393, filed April 7, 2000, PCT/US99/16226, filed July 20, 1999, and PCT/US99/16378, filed July 20, 1999, the entirety of which is incorporated herein by reference.

Examples of other apparatus include monitors, thermometers, pulse pressure monitors, accelerometers, sensing or stimulating electrodes, etc. Regardless of the type of apparatus used, the present invention provides a means for repeatable, reliable and guaranteed alignment at the desired position to which the alignment device may be attached.

In various embodiments, the present invention is described as being useful in continuous analyte monitoring. In such instances, the present invention allows for a reliable and repeatable method to properly center a fluid harvesting device (also called a fluid collection and sensor device). This integrated system allows for a tissue breaching device to be applied and guarantees alignment as well as giving easy access to attach a device to the exposed site. The tissue interface member can adhere to the tissue and remain in its original position unaffected. Although various embodiments of the present invention are directed towards continuous analyte monitoring, it will become apparent to one skilled in the art that the present invention could be used with various applications to other uses that require alignment with a specific centered location on the surface of a tissue for continuous or numerous measurements, applying therapies of any variety, and creating openings in the tissue of any size, etc.

According to one embodiment of the present invention, Figures 2A and 2B show the alignment device 100 comprising a tissue interface member 500 having a raised perimeter 550 along the circumference thereof with at least one clip 600 extending therefrom. The clip 600 is biased by virtue of its inwardly curved lip or other structural feature (known in the art of mechanical clip design) so that it engages an apparatus inserted therein and holds it in engagement with the tissue interface member 500. Furthermore, the tissue interface member 500 has an opening or passageway 200 circumscribed by an interior surface 300 of the tissue interface member 500. With reference to Figure 2C, when an apparatus 1000 is properly inserted into the tissue interface member 500 and snapped into place beneath the clip(s) 600, the tissue interface member 500 holds the apparatus 100 in a predetermined or desired relationship with respect to the opening 200, and thus with a tissue surface underlying the opening as shown in Figure 2C. This allows the apparatus 1000 to interact with the surface of the tissue at the desired location maintained by the alignment device 100. Figures 2A-2C are enlarged and are not to scale (particularly as to the thickness of the device) in order to illustrate the various structural features of the alignment device.

When the tissue breaching device involves an energy emitter apparatus, oftentimes energy absorbing film is used therewith. The film is responsive to energy directed thereon to heat up and to conductively transfer heat to the surface of the tissue to ablate the tissue. Such an optical thermal ablation process is disclosed in aforementioned U.S. Patent No. 5,885,211. Referring back to Figure 2A in conjunction with Figure 2B, an energy absorbent layer 400 is shown placed across the top of the opening 200 of the tissue interface member 500. An adhesive layer 700 and a release liner 800 are provided on a bottom surface of the tissue interface member 500 for attaching the alignment device 100 to the surface of a tissue. When the alignment device 100 is attached via the adhesive layer 700, the release liner 800 is first removed so that the adhesive layer 700 may be exposed and attached to the desired location on a surface. The adhesive layer 700 also has an opening or passageway 210 therein circumscribed by the interior 305 of the adhesive layer 710. Moreover, the adhesive layer opening 210 is in alignment with the opening 200 of the tissue interface member

500. In the alternative or in combination, the alignment device 100 can further comprise a strap 750 that attaches to the tissue interface member 500 and extends around a body portion of an user, such as an arm, leg, or waist, so as to mount and hold the tissue interface member 500 at the desired location on the surface of the tissue for the desired duration of time.

According to another embodiment shown in Figure 3, the tissue interface member 500 may engage with an apparatus via a threaded member 900 that circumscribes a side exterior surface 355. Like Figures 2A-2C, Figure 3 is not drawn to scale in order to best illustrate the invention. The opening 200 longitudinally traverses through the tissue interface member 500 and is aligned with the adhesive layer opening 210 of the optional adhesive layer 700. Figure 2 illustrates how a surface of an apparatus 1000 has a complementary threaded member 950 therein that mates with the threaded member 900 of the tissue interface member 500.

Figures 4A – 4E are directed to another embodiment of an integrated alignment device according to the present invention. In this embodiment, the integrated alignment device 100 is designed for an application that involves the use of an energy emitter device and an energy absorbent layer 400, in cooperative operation, to ablate the surface of a tissue. The alignment device 100 comprises a tissue interface member 500 that is circular in shape with an opening 200 therein and several layers attached thereto to facilitate placement on the surface of the tissue and engagement of various apparatus.

As shown in Figure 4B, several release liner/adhesive layers are in a sandwich-type configuration. There is a bottom double-sided adhesive layer 710 attached on its top side to the bottom of the tissue interface member 500 and covered on its bottom side by a bottom release liner 810. This bottom release liner 810 may be removed so that the bottom adhesive layer 710 and the tissue interface member 500 may adhere to the skin. The bottom adhesive layer 710 preferably is one that is not irritable, toxic or otherwise hazardous to the skin but is strong in its adhesiveness to allow the tissue interface member 500 to remain attached to the surface of the skin when used with multiple applications of an apparatus to the tissue interface member 500. An example of such type of an adhesive commonly used is the Brandon 2656B double adhesive.

The bottom adhesive layer 710 also has an opening 210 therein that is circumscribed by the interior surface 305 of the bottom adhesive layer 710. This adhesive opening 210 is smaller in diameter than the diameter of the tissue interface member 500. The tissue interface member 500 is attached along the perimeter of the top side of the bottom
5 adhesive layer 710. Above the bottom adhesive layer 710 and within the tissue interface member 500, there is a carrier layer (not shown) with an aperture 225 that contains an energy absorbent layer 400 therein aligned with the adhesive opening 210. A pocket or gap 575 is provided to allow room for a cable that may connect to an apparatus that mates with the tissue interface member shown in these diagrams. The
10 internal elements of the tissue interface member 500 are better shown in Figure 4C.

Turning to Figure 4C, the area of the top side of the bottom adhesive layer 710 circumscribed by the interior surface 300 of the tissue interface member 500 is attached to the non-sticky (e.g. silicon) surface of a carrier layer 450. An example of a carrier layer that may be used is the Kraft Release Liner with a silicon surface on one side and
15 a paper surface on the other side. The carrier layer 450 also has a carrier layer aperture 225 therein circumscribed by the interior surface 310 of the carrier layer 450. The carrier layer aperture 225 is in alignment with the adhesive opening 210 and may be the same size or smaller. Within the carrier layer aperture 225 lies an energy absorbent layer 400 that is concentric to but smaller than the carrier layer aperture 225 and in
20 alignment with the carrier layer aperture 225 and the adhesive opening 210. The energy absorbent layer 400 is fixed in its position within the carrier layer aperture 225 by the bottom side of a top double adhesive layer 730. The top double-sided adhesive layer 730 also fits within the opening 200 circumscribed by the interior surface 300 of the tissue interface member 500. Furthermore, the top double-sided adhesive layer 730
25 has an orifice 250 therein that is also circumscribed by the interior surface 315 of the top double-sided adhesive layer 730. The orifice 250 is concentric to but smaller than the carrier layer aperture 225 and again is in alignment with the carrier layer aperture 225 and the adhesive opening 210. The size and alignment of the orifice 250 allows the top double-sided adhesive layer 730 to circumscribe and overlap the interior perimeter
30 of the carrier layer aperture 225. This overlap provides the surface area to which the

energy absorbent dye layer 400 may attach enabling it to be fixed in such a position so that it suspends with the carrier layer aperture 225. Finally, a non-sticky side of the top release liner 830 attaches to the top of the top double-sided adhesive layer 730 until the alignment device 100 is ready to be used. Similar to the bottom release liner 810, the top release liner 830, as shown in Figure 4A, also has an extended flap portion 820 for the user to grab to facilitate the removal of the release liner.

Figures 4D and 4E show how the alignment device of Figures 4A-4C is used in a continual analyte monitoring system. Once the bottom release liner 810 is removed, the tissue interface member is attached to the surface of the tissue (skin) via the bottom adhesive layer 710. The top release liner 830 is then removed and an energy emitter device 1010 (such as a laser diode apparatus) is inserted into the tissue interface member 500 and engages the top double-side adhesive layer 730. The tissue interface member 500 is already attached to the surface of the tissue via the bottom adhesive layer 710. When in position in the tissue interface member 500, the energy emitter device 1010 is aligned such that at least one source of an energy emission 1015 emitted by the energy emitter device 1015 is in alignment with the orifice 250 which is in alignment with the energy absorbent layer 400, which is in alignment with the carrier layer aperture 225, which in turn is in alignment with the adhesive opening 210 as shown in Figure 4D. After the energy emission is complete, the energy emitter device 1010 can then be removed from the tissue interface member 500 leaving the integrated alignment device 100 fixed at the original alignment registration site. According to this embodiment of the invention, removal of the energy emitter device 1010 also simultaneously removes top adhesive layer 730, the energy absorbent layer 400 and the carrier layer 450 in one step, leaving the tissue interface member 500 attached to the surface of the skin by the bottom adhesive layer 710. Referring to Figure 4E, the harvesting head 1155 of the fluid collection and sensor device 1150 may be inserted into and mated with the tissue interface member 500 which aligns the harvesting head 1155 with affected site of the tissue so that the source of suction is directly over the adhesive opening 210 and over the affected tissue site (not shown) created by the previous application of the energy emitter device.

The selection of materials and dimensions of an alignment device according to the present invention may vary with the particular application. In the case where the energy absorbing layer 400 is used in connection with a laser diode type energy emitter device, the energy absorbing layer is formed of a layer of PET (1 mil) and of Acetylene Black (2 mil) and approximately 4.9 mm in diameter. The thickness of the top
5 adhesive layer 730 is 6.3 mil and the thickness of the bottom adhesive layer 710 is 6.0 mil. The diameter of the orifice 250 is 3.5 mm and the diameter of the opening 210 is 5.0 mm.

Other embodiments of the invention provide for various other means for which
10 the tissue interface member might engage with an apparatus. For example, the tissue interface member can comprise any planar geometric shape, such as a triangle, a circle, ellipse, rectangle, etc., to facilitate interface with an apparatus that contains complementary elements to mate with the tissue interface member. Figure 5 shows an embodiment where the tissue interface member 500 comprises a circular shape with an
15 opening 200 therein circumscribed by its interior surface 300. According to this embodiment, the interior surface 300 and the exterior surface 350 of the tissue interface member 500 mate to a complementary shaped groove or indented region 1005 of a tissue interface member engaging portion of the apparatus 1000.

In addition or in the alternative to any of the embodiments described herein, the
20 tissue interface member can have additional structural features that facilitate mating with an apparatus. Examples of such characteristics include, but are not limited to, complementary magnetic surface portions, adhesive on engaging surfaces, and/or complementary male or female members. For example, Figure 6 shows a tissue interface member that has at least one female member 625. According to this
25 embodiment, the tissue interface member engaging portion of an apparatus 1000 has complementary male member(s) 650 that mate with the female members 625 of the tissue interface member 500 to achieve and maintain the desired alignment while the tissue interface member 500 is attached to the tissue surface. Furthermore, these male or female members can also have complementary magnetic surfaces or adhesive to

enhance attachment and maintenance of the alignment between the tissue interface member 500 and the tissue interface member engaging portion of the apparatus 1000.

Figures 7A and 7B illustrate another embodiment of the invention where the top surface of the tissue interface member 500 comprises of at least one male member 635 and also has an opening 200 circumscribed by the interior surface 300 so that an
5 apparatus may interact with the surface of the tissue via opening 200. Complementary female members would be on the apparatus that are designed to mate with the tissue interface member shown in Figures 7A and 7B.

Figures 8A – 8G inclusively show operation of an alignment device according
10 to one embodiment of the invention (Figures 7A and 7B) in the context of a continual analyte monitoring system. It should be understood that the alignment device according to the other embodiments operates in a similar fashion according to its structural features. Figure 8A shows the tissue interface member 500 attached to the surface of a skin via an adhesive (not shown). The tissue interface member 500 has at
15 least one male member 635 as shown in Figures 7A and 7B. A tissue interface member engaging portion 1100 of an apparatus 1000 (in this case a tissue breaching device) with at least one complementary female member 655 is placed above the tissue interface member 500. Figure 8B shows the tissue breaching apparatus 1100 mating with the tissue interface member 500 via their complementary male and female
20 members, respectively. Figure 8B also shows that the tissue breaching device 1100 has formed at least one opening 1200 through the surface of the tissue. The manner in which these openings are formed depends on the type of tissue breaching apparatus selected (mechanically piercing the tissue, thermally ablating the tissue with an electrically heated wire, thermally ablating the tissue by heating an energy absorbing
25 layer in contact with the tissue with a beam or field of energy, emitting a beam or field of energy that is directly absorbed by the tissue to form the openings, etc.) An example of an energy emitter apparatus is an laser beam device disclosed in U.S. Provisional Applications No. 60/140,003, filed June 18, 1999 and 60/165,814, filed November 16, 1999, the entirety of which is incorporated herein by reference. Figure 8C shows the
30 tissue interface engaging portion 1100 of the tissue breaching device (not shown)

detaching from the tissue interface member 500 after creating at least one opening 1200 on the surface of the tissue. The tissue interface member 500 remains attached to the surface of the tissue at the initial registration site. Figure 8D is another view of the tissue interface member 500 remaining fixed at the original placement site after the surface of the tissue had been breached by a tissue breaching device. Figure 8E shows the fluid collection and sensor device 1150 having complementary female members (their general location being shown by arrows 665 but not in view in Figure 8E) that mate to male members 635 on the tissue interface member 500. The male members 635 on the tissue interface member are in a fixed and known position such that the openings 1200 formed in the tissue by the tissue breaching device are at a fixed position with respect to the tissue interface member 500. Consequently, the subsequent attachment of the fluid collection and sensor device 1150 to the tissue interface member (with female members 665 placed at a fixed and known position with respect to internal structures thereof) will achieve proper alignment with the openings 1200 to draw fluid (by vacuum) from the openings into the harvesting head 1155 (which is essentially an opening into a housing of the sensor device 1150) where the fluid collection/analysis chamber 1190 is located inside the sensor device 1150. This interaction is facilitated and enhanced by the consistent registration to the site by the tissue interface member 500. Figure 8F shows the fluid collection and sensor device 1150 matingly engaging the tissue interface member 500 and Figure 8G shows the fluid collection and sensor device 1150 completely engaged with the tissue interface member 1150 such that fluid 1250 in the tissue can pass through the openings 1200 in the tissue and into the fluid collection chamber 1190. A fluid collection and sensor device of this type comprises an assay element that reacts with one or more analytes, such as glucose, to provide a reading of a concentration of such one or more analytes for an individual.

Once the alignment device of the present invention is properly placed, the systems and methods of the present invention allow for new fluid collection and sensor devices to attach to the tissue interface member after poration has occurred to thereby use the same set of tissue openings formed at the location of the tissue interface member. The advantage is that the same set of openings can be used repeatedly for

fluid extraction without having to make new openings. Consequently, whereas the fluid collection and sensor device may have a limited useful lifetime, new ones can be installed to use the same set of openings repeatedly for fluid extraction without having to make new openings. Similarly, for delivery applications, the same set of openings
5 can be used for different and multiple delivery events.

According to another aspect of the present invention, a mechanism is provided to provide certain safety features and to assist in aligning an apparatus in the alignment device. These safety features may be useful to prevent tissue breaching, fluid extraction and/or substance delivery if the attachment of the apparatus device is not
10 proper.

Figure 9 shows the tissue interface member engaging portion of the apparatus 1000 having at least one female member 655 allowing it to matingly engage with at least one complementary male engaging member 635 on the tissue interface member 500. The apparatus is, for example, a laser beam device of the type referred to in the
15 above-mentioned provisional application. However, this feature may be useful in a type of apparatus that is to be operated only when properly in position in an alignment device. A sensor 1020 is provided in the apparatus 1000 that is positioned in proximity to a female member such that it is mechanically or electrically tripped when engaged by the at least one male member 635 on the tissue interface member 500. The sensor 1020
20 is also electrically coupled to a controller 1040. The sensor 1020 is, for example, a switch that is closed when engaged by the male member 635 on the tissue interface member 650 when the apparatus 1000 is properly engaged in the tissue interface member 500. When the switch 1020 is closed, an enable signal is coupled to the controller 1040 (or a circuit is completed and detected by the controller 1040) which
25 will in response, enable operation of the apparatus. While the apparatus 1000 is properly mated to the tissue interface member 500, the apparatus is fully enabled and may be activated by a control button (or other user control or automatic control mechanism) to interact with the surface of the tissue. In the embodiment shown in Figure 9, the apparatus 1000 interacts with the surface of the tissue through the opening
30 200 of the tissue interface member 500. As an additional optional feature, a pressure

(force) sensor 1030 is also provided that is responsive to upward pressure from the tissue interface member 500 when the apparatus 1000, such a laser beam device, is pressed downward. Sufficient downward pressure of the apparatus 1000 against the tissue interface member may be a prerequisite to enabling activation or actual activation of the apparatus. In this way, the apparatus will not be activated unless the switch 1020
5 detects proper engagement in the tissue interface member 500 and the pressure sensor 1030 detects that sufficient downward force is being applied to the apparatus 1000.

According to one aspect, the present invention is directed to an alignment device for aligning at least one apparatus with respect to a surface of a tissue,
10 comprising a tissue interface member suitable for positioning on the surface of the tissue and mating with the apparatus to maintain alignment of the apparatus during an operation of the apparatus.

According to another aspect, the present invention is directed to a system comprising: a tissue interface member suitable for positioning on the surface of the tissue; a tissue breaching apparatus that mates with the tissue interface member to
15 achieve a desired alignment with the surface of the tissue; and a sensor device capable of mating to the tissue interface member when the tissue breaching device is not mated to the tissue interface member to achieve alignment with an ablated site of the tissue, wherein the sensor device detects a characteristic of a biological fluid collected from the ablated site of the tissue. The tissue breaching device may be any device that
20 mechanically breaches the tissue, a heatable element device that thermally ablates the tissue, and an energy emitter device capable of emitting energy that is directly absorbed by the tissue. Alternatively, the tissue breaching device cooperates with an energy emitter device that cooperates with an energy absorbing layer positioned on, or a part
25 of, the tissue interface member.

Similarly, the present invention is directed to method for detecting a characteristic of a biological tissue, comprising the steps of: placing a tissue interface member at a desired position onto the surface of the tissue; mating a tissue breaching apparatus to the tissue interface member to achieve alignment with the surface of the
30 tissue; activating the tissue breaching apparatus; detaching the tissue breaching

apparatus from the tissue interface member; and mating a sensor device to the tissue interface member to achieve alignment with a breached tissue site.

The present invention also is directed to a sensor device for sensing a characteristic of a biological fluid collected from a tissue, comprising: a housing; at
5 least one opening in the housing to collect biological fluid from the tissue; at least one alignment member suitable for mating with a complementary alignment member of a tissue interface member positioned on a surface of the tissue for aligning the at least one opening in the housing with a predetermined surface portion of the tissue.

Similarly, the present invention is directed to an energy emitter apparatus
10 comprising: an energy source for emitting energy suitable for absorption by an energy absorbing layer positioned in substantial contact with a surface of a tissue; and at least one alignment member suitable for mating with at least one complementary alignment member of a tissue interface member positioned on a surface of the tissue for aligning the energy emitted by the energy source with the energy absorbing layer.

15 The above description is intended by way of example only.

We claim:

1. An alignment device for aligning at least one apparatus with respect to a surface of a tissue, comprising a tissue interface member suitable for positioning on the surface of the tissue and mating with the apparatus to maintain alignment of the apparatus during an operation of the apparatus.
2. The alignment device of claim 1, further comprising an energy absorbing layer attached to the tissue interface member, wherein the energy absorbing layer is responsive to energy directed thereon to heat up and to conductively transfer heat to the surface of the tissue to ablate the tissue.
3. The alignment device of claim 2, wherein the energy absorbing layer further comprises a first and a second side, wherein the second side comprises adhesive material disposed thereon for adhering to the surface of the tissue.
4. The alignment device of claim 3, wherein the energy absorbing layer is removable from the tissue interface member after tissue ablation.
5. The alignment device of claim 2, wherein the tissue interface member mates with a first apparatus that emits energy to the energy absorbing layer to cause tissue ablation and with a second apparatus suitable for detecting a characteristic in a fluid collected from the tissue.
6. The alignment device of claim 1, wherein the tissue interface member comprises of at least one clip that mates with a surface on the apparatus to hold the apparatus with respect to the tissue interface member.
7. The alignment device of claim 6, wherein the clip is biased to hold the first apparatus and second apparatus under tension.

8. The alignment device of claim 1, wherein the tissue interface member has an exterior and an interior surface.

9. The alignment device of claim 8, wherein interior surfaces of the tissue interface member engage with surfaces of the apparatus to align the apparatus with the tissue interface member.

10. The alignment device of claim 8, wherein the exterior surfaces of the tissue interface member engage with surfaces of the apparatus to align the apparatus with the tissue interface member.

11. The alignment device of claim 8, wherein the tissue interface member comprises a male alignment member or a female alignment member that mates with a complementary female alignment member or a male alignment member, respectively, on the apparatus.

12. The alignment device of claim 1, wherein the tissue interface member comprises at least one magnetic surface portion to mate with at least one complementary magnetic surface portion on the apparatus.

13. The alignment device of claim 1, wherein the tissue interface member comprises a threaded member that mates with a complementary threaded member on the apparatus.

14. The alignment device of claim 1, wherein the tissue interface member further comprises an adhesive element allowing the device to be attached to the surface of tissue.

15. The alignment device of claim 1, wherein the tissue interface member comprises a strap that extends around a body portion of a user to mount and hold the tissue interface member to the surface of the tissue at a desired position.

16. In combination, the alignment device of claim 1, and a sensor to detect a characteristic of a biological fluid collected from the tissue, wherein the sensor comprises at least one alignment element that mates with the tissue interface member to achieve alignment with the tissue.

17. In combination, the alignment device of claim 1, and an energy emitter apparatus comprising at least one energy source for emitting energy, wherein the energy emitter apparatus comprises at least one alignment member that mates with the tissue interface member to achieve alignment with the tissue.

18. The combination of claim 17, wherein the energy emitter apparatus further comprises a controller and a sensor coupled to the controller, the sensor detect when the energy absorbing apparatus is in position on the tissue interface member, wherein the controller is responsive to the sensor to enable activation of the energy emitter apparatus.

19. The combination of claim 18, wherein the sensor on the energy emitter apparatus comprises a pressure sensor responsive to sufficient pressure from engagement with the tissue interface member.

20. The combination of claim 19, wherein the energy emitter apparatus further comprises a switch that is closed by an element on the tissue interface member when the energy emitter apparatus is properly installed in the tissue interface member, wherein the controller of the energy emitter apparatus is responsive both to the switch being closed and the pressure sensor detecting sufficient pressure to enable activation of the energy emitter apparatus.

21. In combination, the alignment device of claim 1, and a tissue breaching device for mechanically breaching the tissue and forming at least one opening therein, wherein the tissue breaching device comprises at least one alignment member that mates with the tissue interface member to achieve alignment with the tissue.

22. In combination, the alignment device of claim 1, and a tissue breaching device comprising a heatable element for breaching the surface of the tissue by thermally ablating the tissue to form at least one opening therein, wherein the tissue breaching device comprises at least one alignment member that mates with the tissue interface member to achieve alignment with the tissue.

23. A system comprising:
a tissue interface member suitable for positioning on the surface of the tissue;
a tissue breaching device that mates with the tissue interface member to achieve a desired alignment with the surface of the tissue; and
a sensor device capable of mating to the tissue interface member when the tissue breaching device is not mated to the tissue interface member to achieve alignment with an ablated site of the tissue, wherein the sensor device detects a characteristic of a biological fluid collected from the ablated site of the tissue.

24. The system of claim 23, wherein the tissue breaching device is capable of mating to the tissue interface member to achieve alignment and is selected from a group comprising of a device that mechanically breaches the tissue, a heatable element device that thermally ablates the tissue, and an energy emitter device capable of emitting energy that is directly absorbed by the tissue.

25. The system of claim 24, further comprising an energy absorbing layer attached to the tissue interface member, wherein the energy absorbing layer is

responsive to energy directed thereon to heat up and to conductively transfer heat to the surface of the tissue to ablate the tissue, and wherein the tissue breaching device comprises the energy emitter device comprising at least one energy source for emitting energy to the energy absorbing layer.

26. The system of claim 25, wherein the energy absorbing layer is removable from the tissue interface member.

27. The system of claim 25, where in the energy absorbing layer comprises an adhesive on one surface thereof to attach at a desired location proximate to the surface of the tissue.

28. The system of claim 27, wherein the energy absorbing layer is simultaneously removed upon detachment of the tissue breaching apparatus.

29. The system of claim 23, wherein the tissue breaching apparatus forms at least one opening in the tissue through which the biological fluid is collected.

30. The system of claim 29, wherein the tissue interface member mates with the sensor device to align the sensor device with the at least one opening in the tissue.

31. The system of claim 30, wherein the sensor device draws biological fluid from the at least one opening under a suction force.

32. A method for detecting a characteristic of a biological tissue, comprising the steps of:

placing a tissue interface member at a desired position onto the surface of the tissue;

mating a tissue breaching apparatus to the tissue interface member to achieve alignment with the surface of the tissue;

activating the tissue breaching apparatus;
detaching the tissue breaching apparatus from the tissue interface member; and
mating a sensor device to the tissue interface member to achieve alignment with a breached tissue site.

33. The method of claim 32, wherein the step of activating a tissue breaching device involves activating the device selected from a group comprising a mechanical device, an electrically heatable element device, or an energy emitter device.

34. The method of claim 33, wherein the step of activating the energy emitter device further comprises the steps of positioning an energy absorbing layer proximate to the surface of the tissue in alignment with the tissue interface member;

mating an energy emitter device to the tissue interface member to achieve alignment with the energy absorbing layer;

activating the energy emitter device to emit energy to the energy absorbing layer, wherein the energy absorbing layer is responsive to energy directed thereon to heat and conductively transfer heat to the surface of the tissue thereby ablating the tissue;

detaching the energy emitter device from the tissue interface member;
and

removing the energy absorbing layer.

35. The method of claim 33, wherein the step of activating the energy emitter device causes the formation of at least one opening in the tissue.

36. The method of claim 35, and further comprising the step of detecting a characteristic of a biological fluid collected from the at least one opening in the tissue with the sensor device.

37. The method of claim 36, wherein the step of positioning the energy absorbing layer comprises adhering the energy absorbing layer to the tissue with an adhesive.

38. The method of claim 34, and wherein the step of placing the tissue interface member on the tissue is performed with the energy absorbing layer attached in a desired alignment to the tissue interface member.

39. The method of claim 34, and further comprising the step of removing the energy absorbing layer from the tissue interface member after the tissue is ablated.

40. The method of claim 34, and further comprising the step of simultaneously removing the energy absorbing layer from the tissue interface member together with detachment of the energy emitter device from the tissue interface member.

41. A sensor device for sensing a characteristic of a biological fluid collected from a tissue, comprising:
a housing;
at least one opening in the housing to collect biological fluid from the tissue;
at least one alignment member suitable for mating with a complementary alignment member of a tissue interface member positioned on a surface of the tissue for aligning the at least one opening in the housing with a predetermined surface portion of the tissue.

42. An energy emitter apparatus comprising:
an energy source for emitting energy suitable for absorption by an energy absorbing layer positioned in substantial contact with a surface of a tissue; and

at least one alignment member suitable for mating with at least one complementary alignment member of a tissue interface member positioned on a surface of the tissue for aligning the energy emitted by the energy source with the energy absorbing layer.

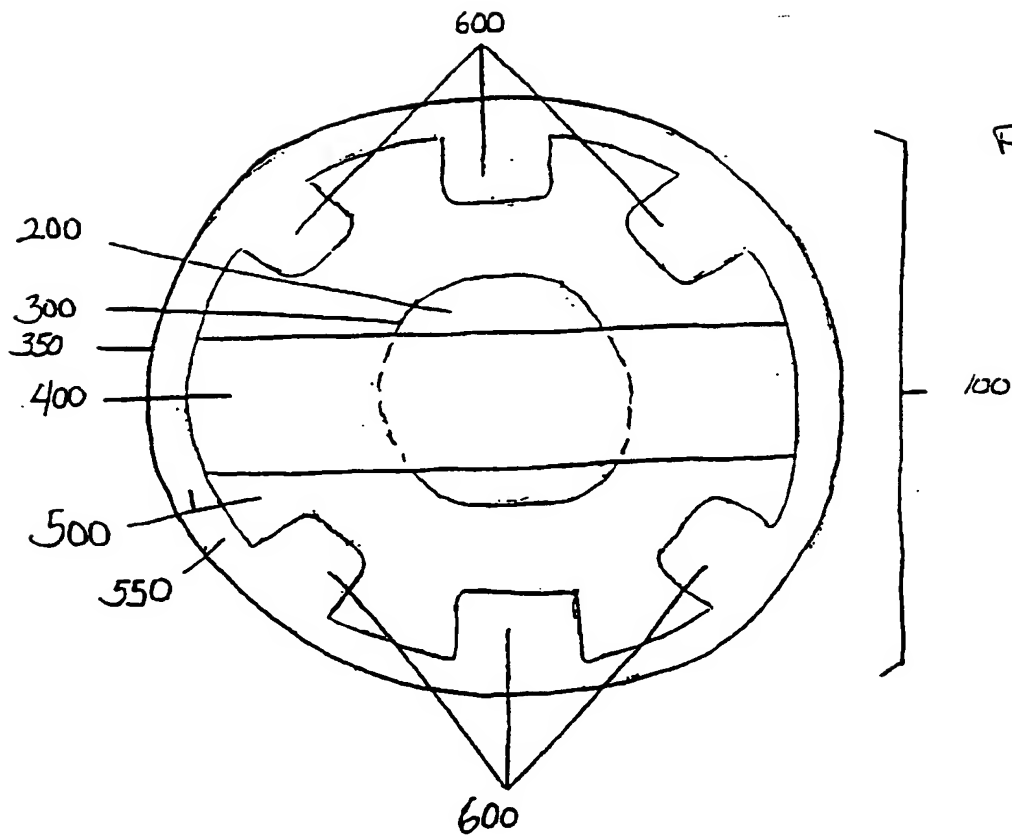


FIGURE 2A

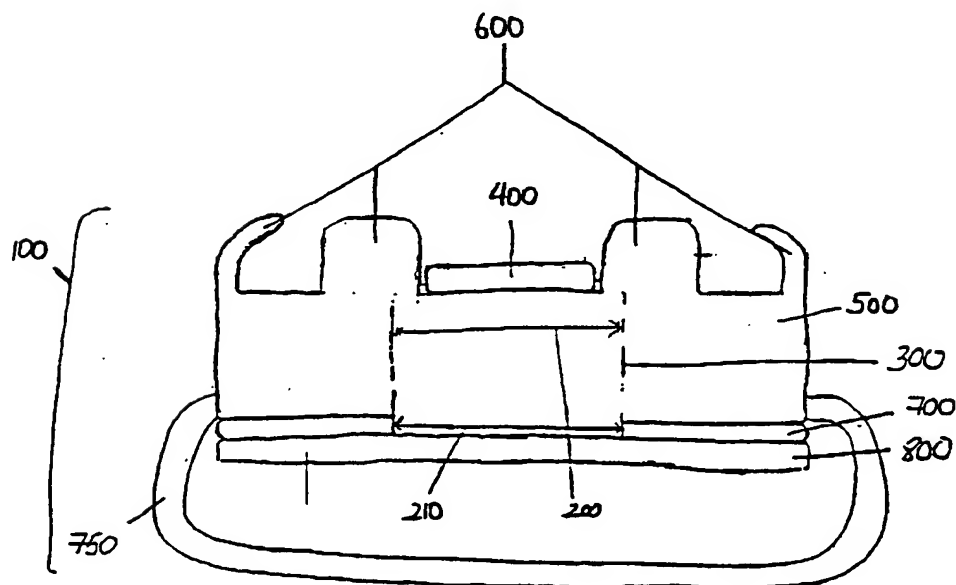


FIGURE 2B

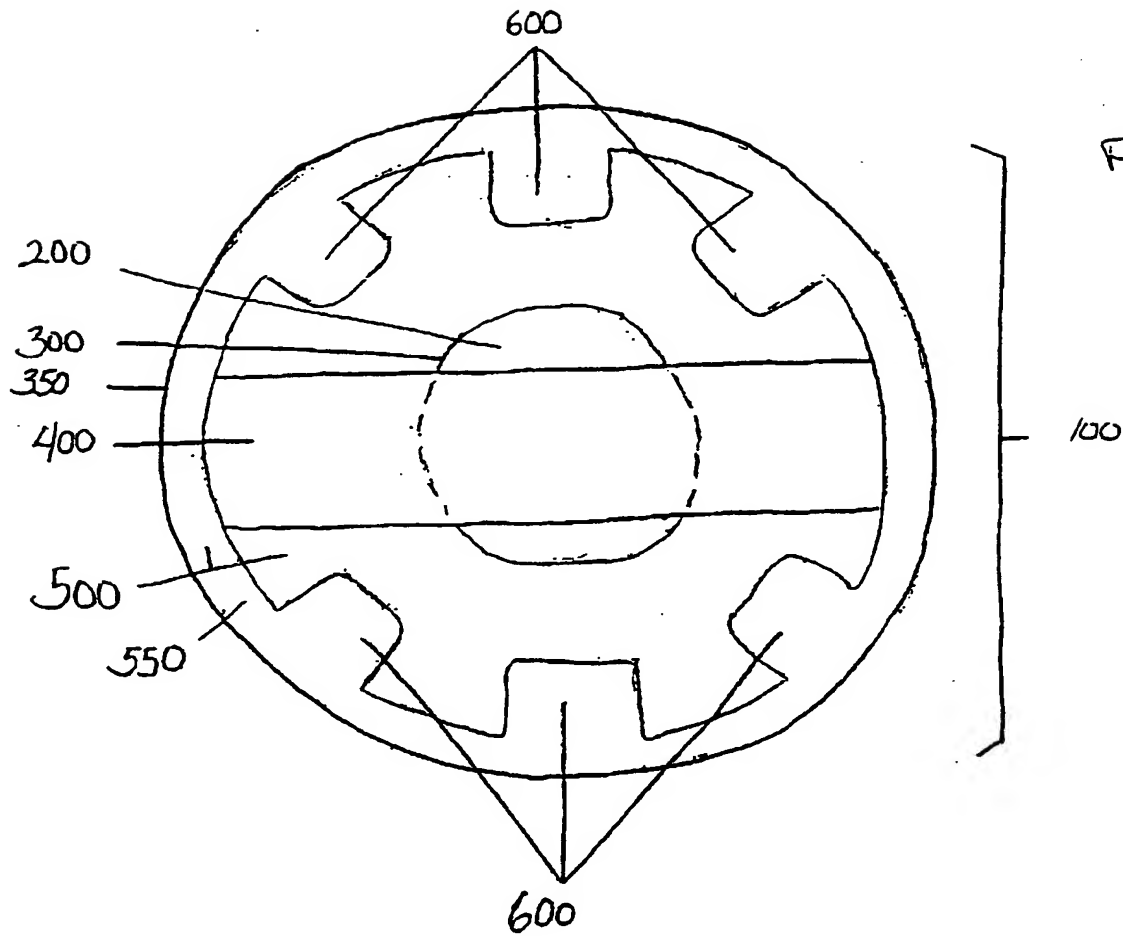


FIGURE 2A

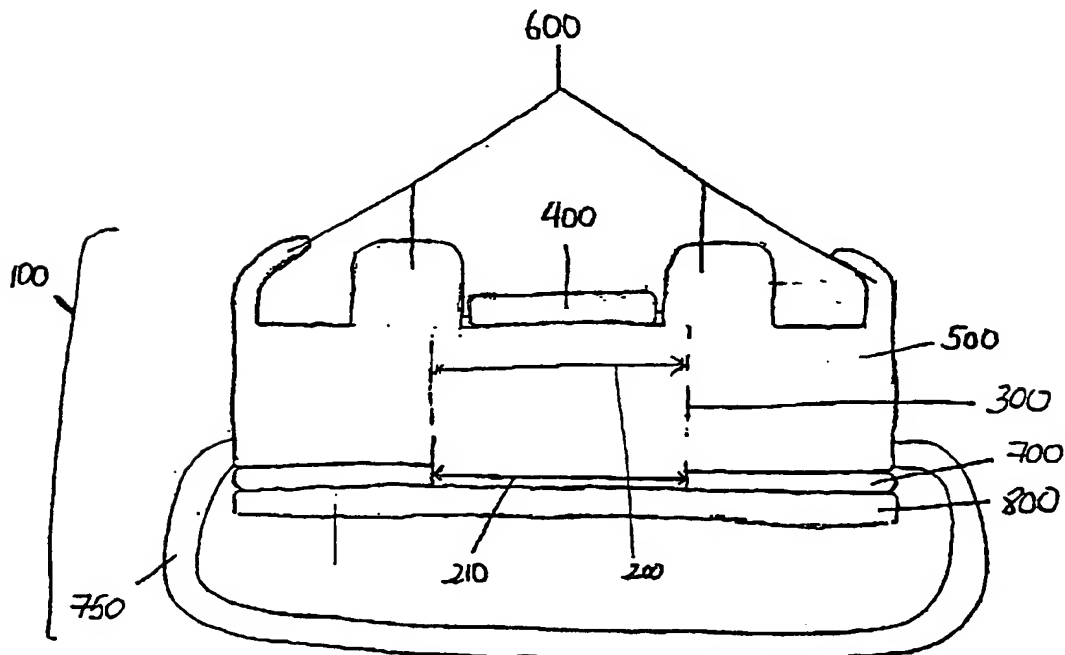
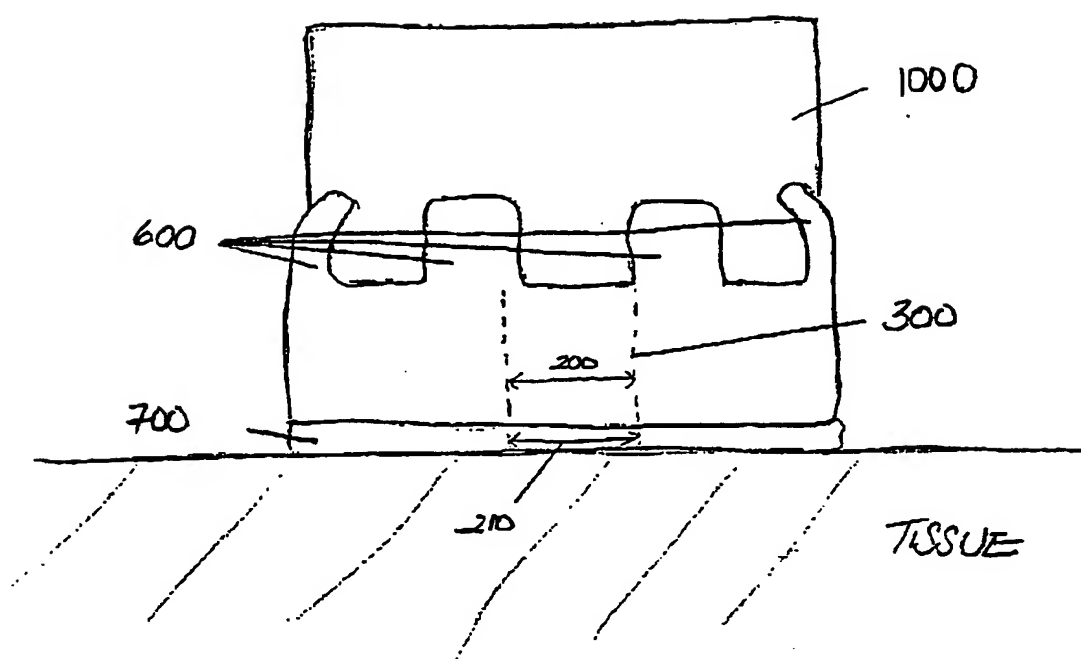


FIGURE 2B

FIGURE 2C



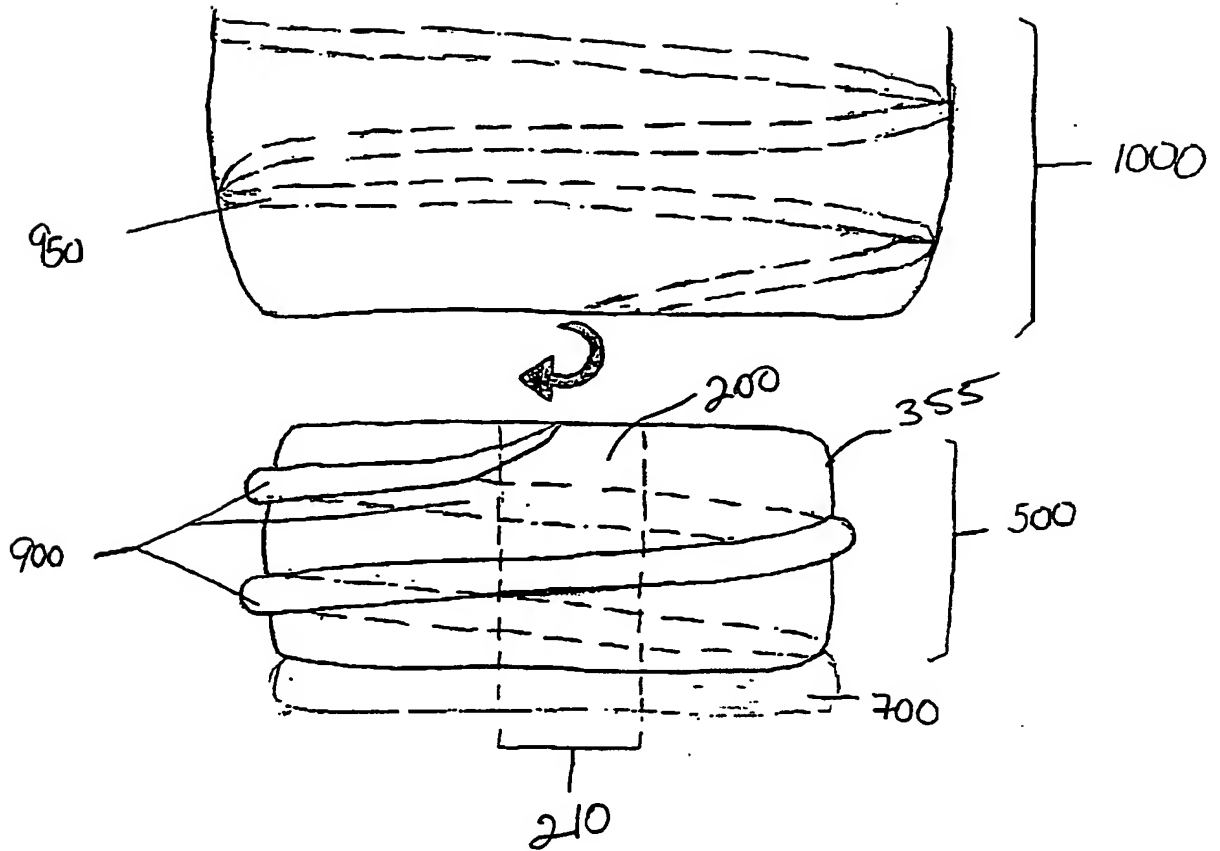


FIGURE - 3

FIGURE 4A

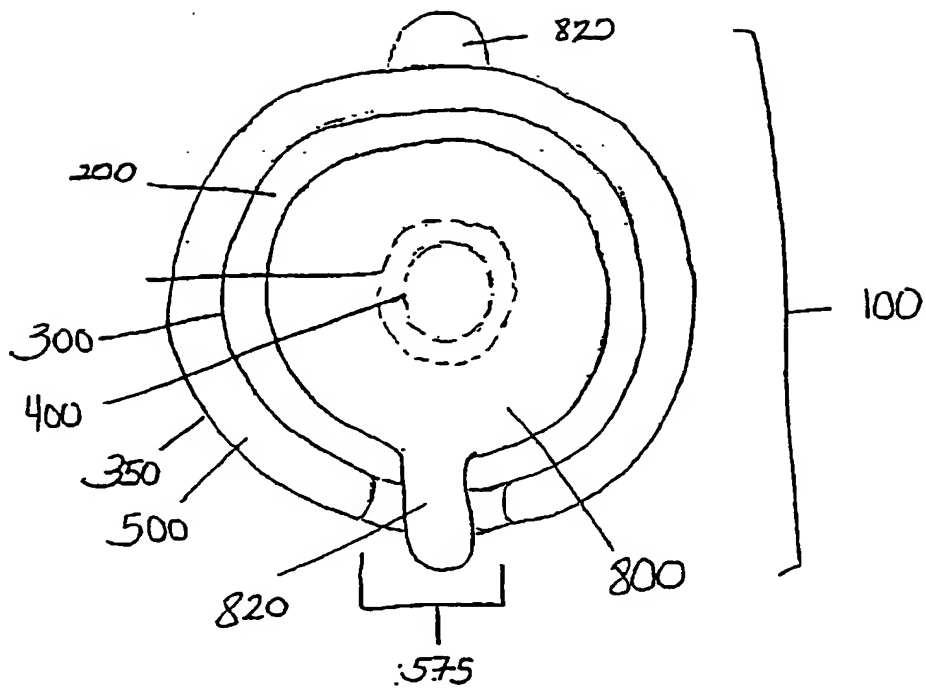


FIGURE 4B

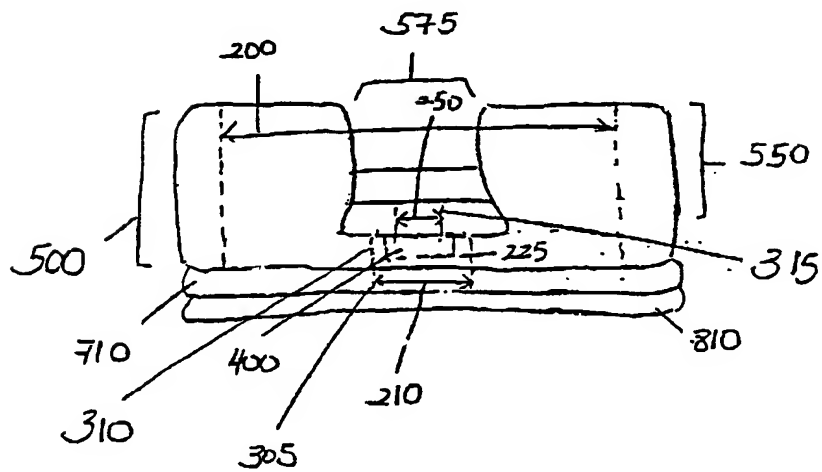


FIGURE 4C

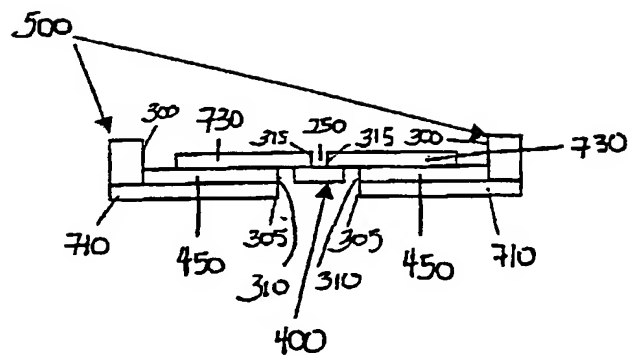


FIGURE 4D

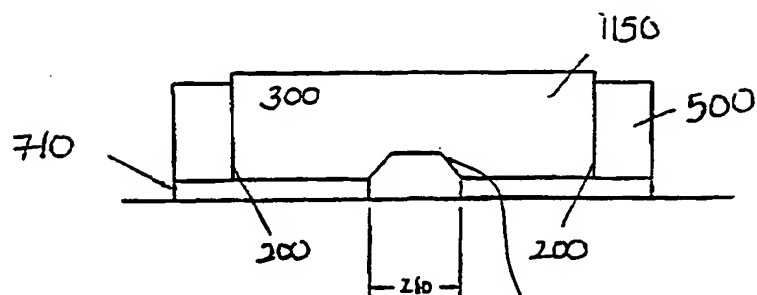
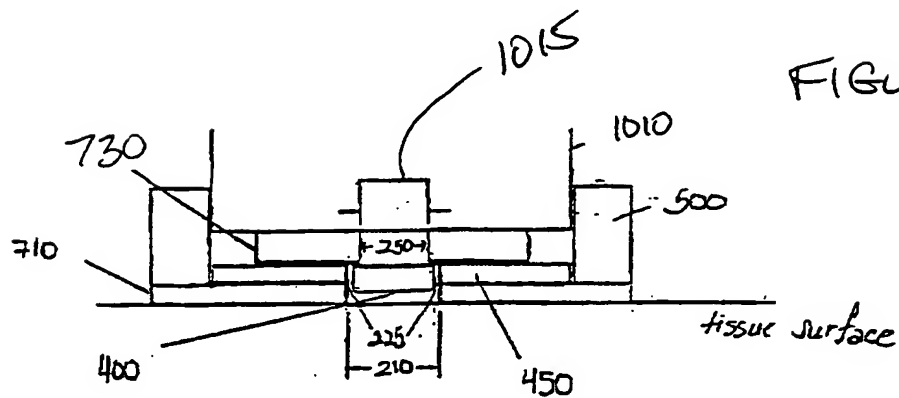


FIGURE 4E

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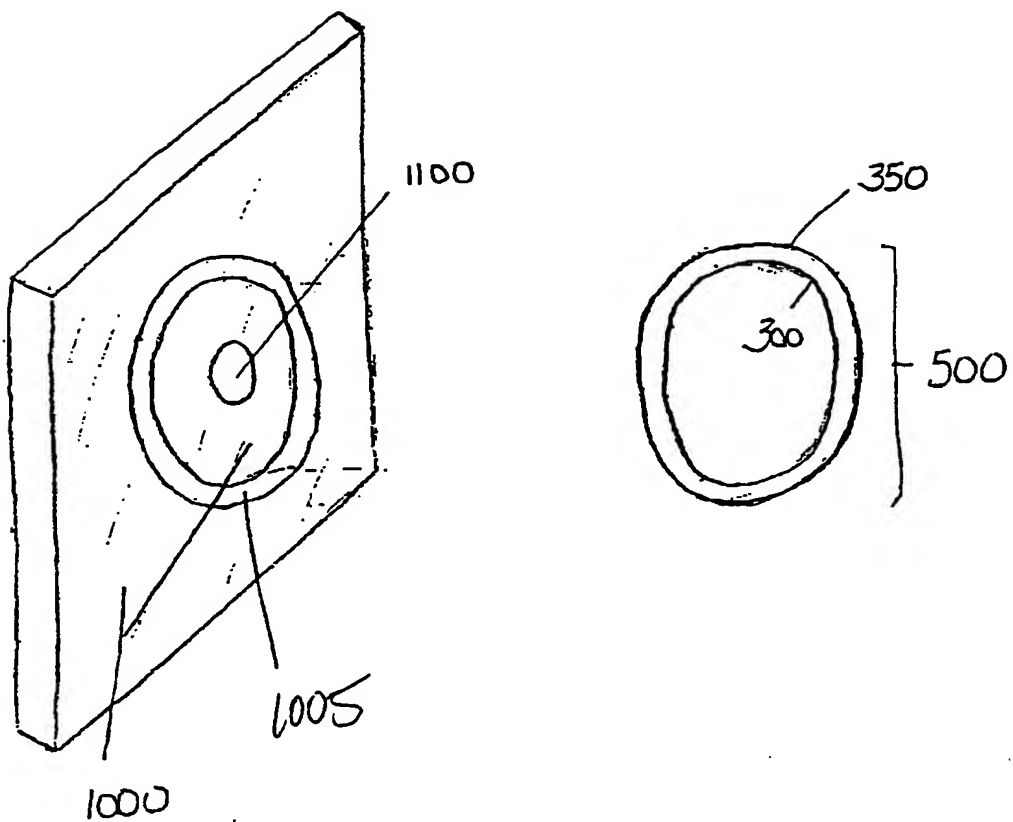


FIGURE 5

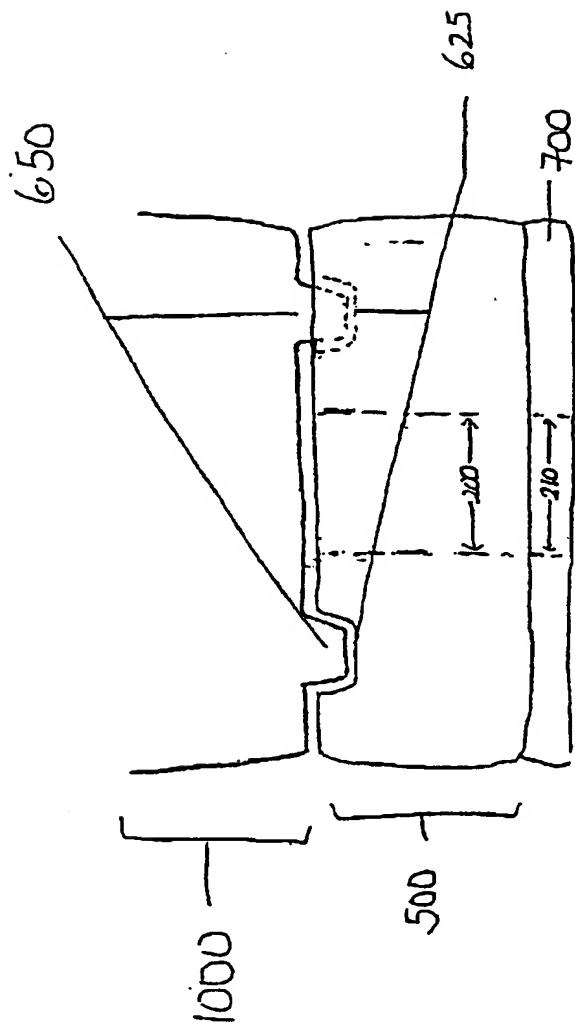
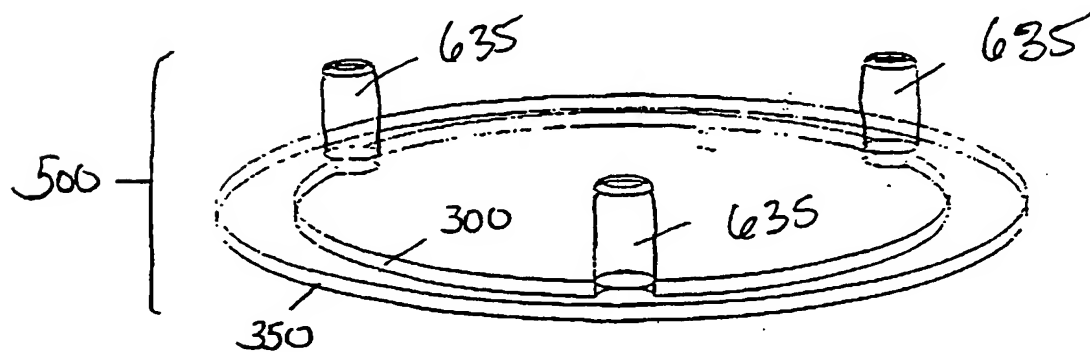
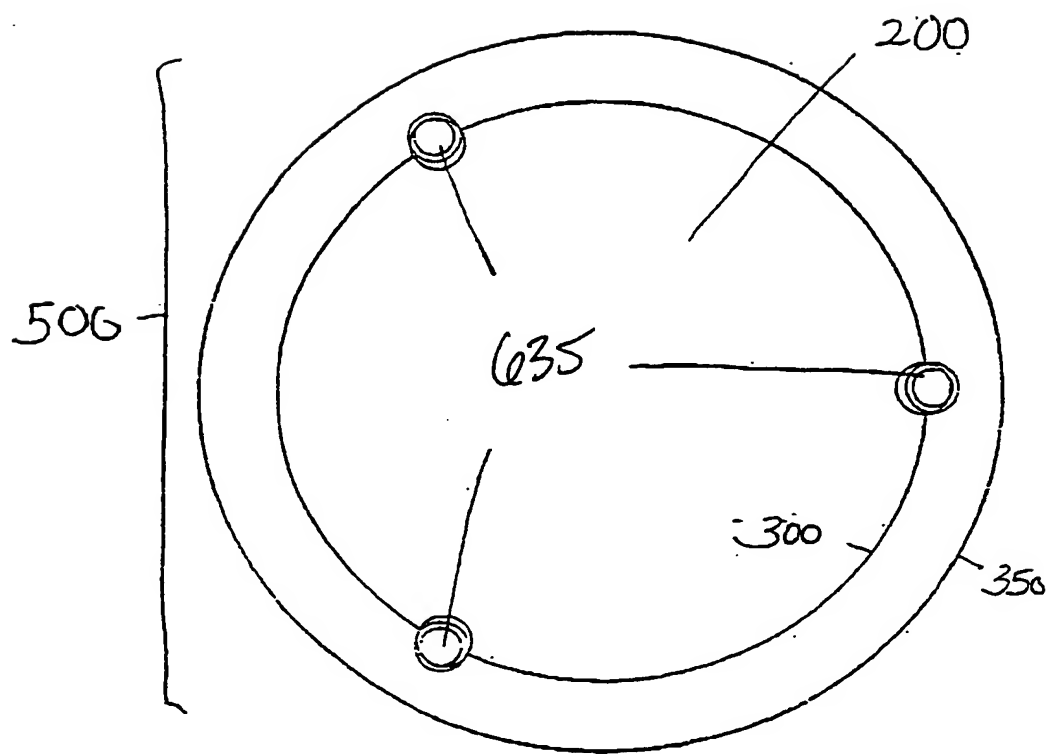


FIGURE 6



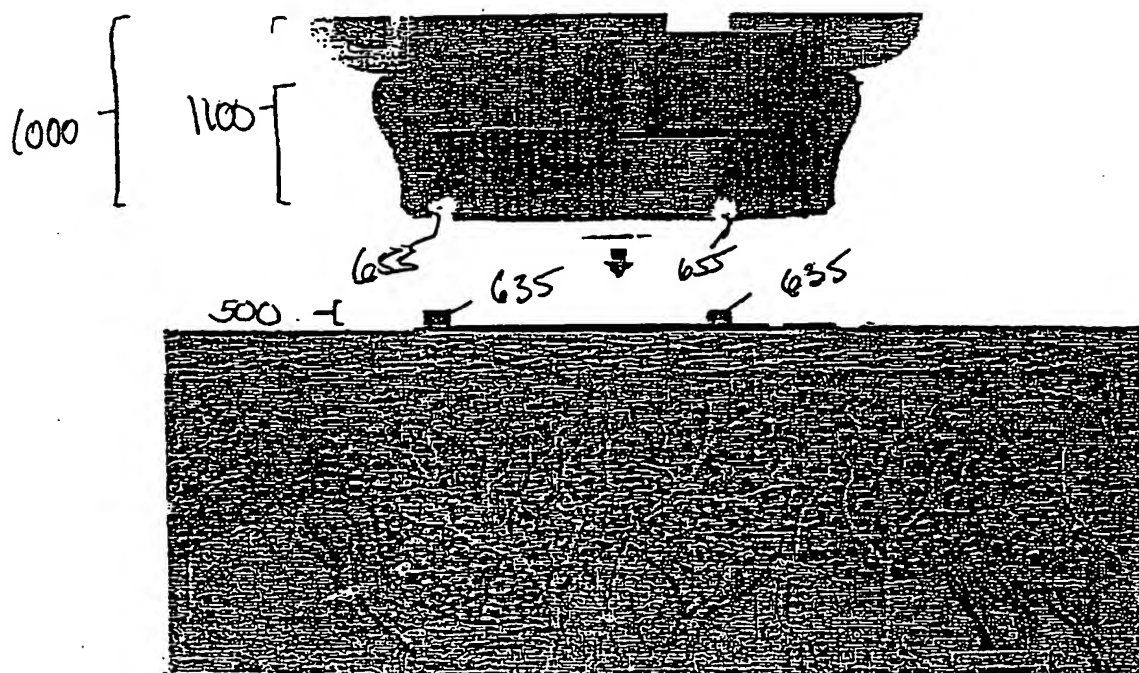


FIGURE 2A

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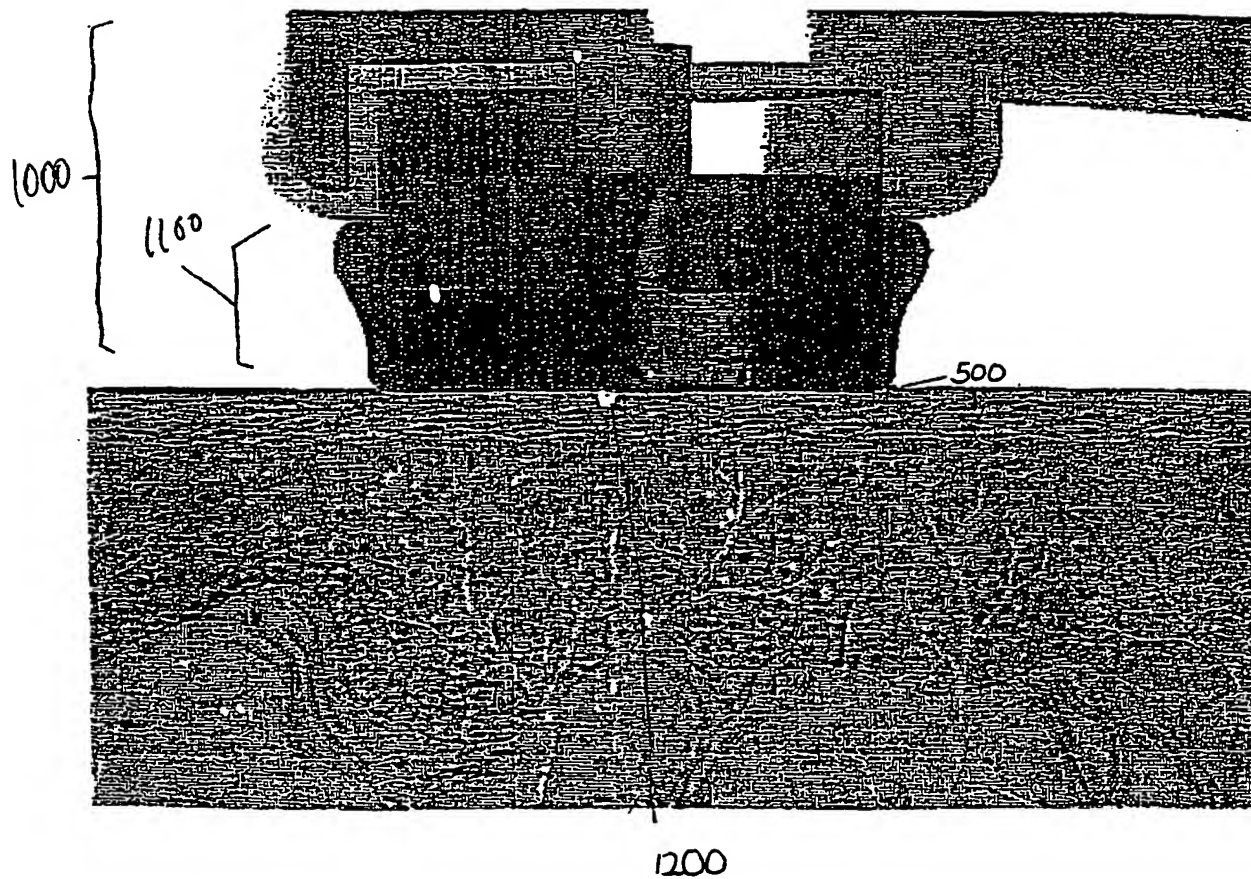


FIGURE 86

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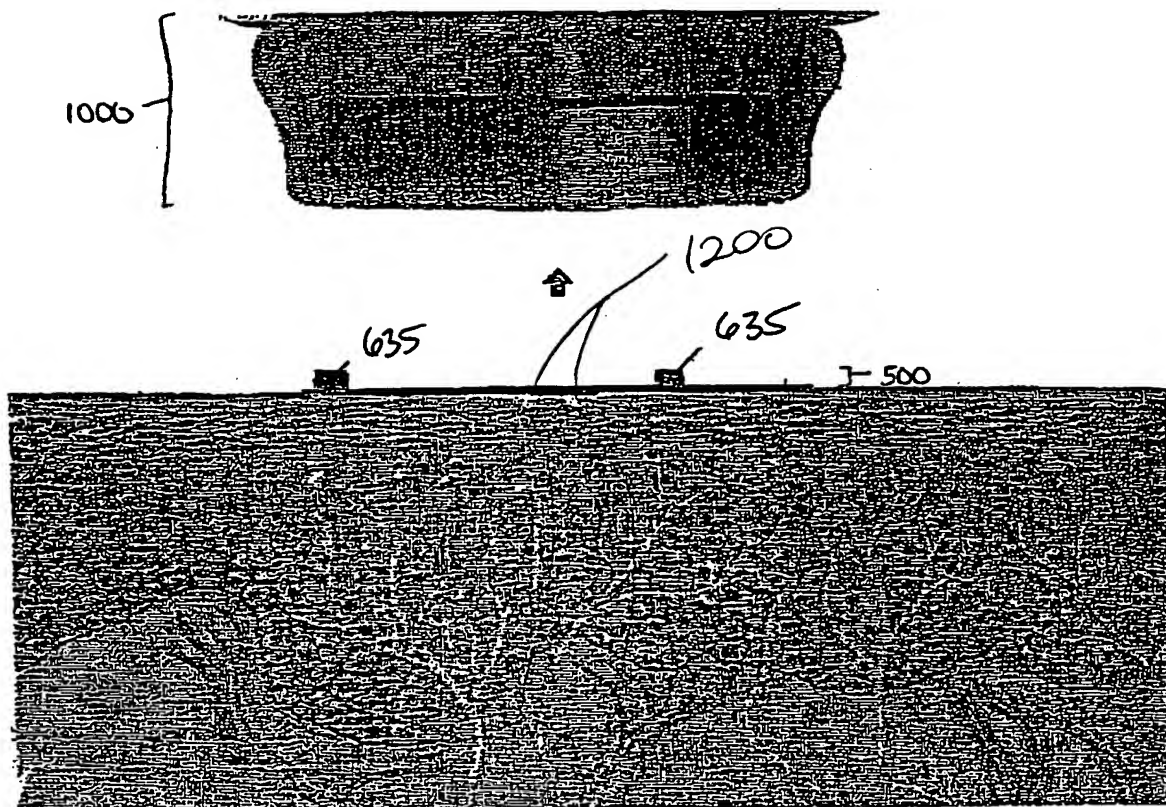


FIGURE 8C

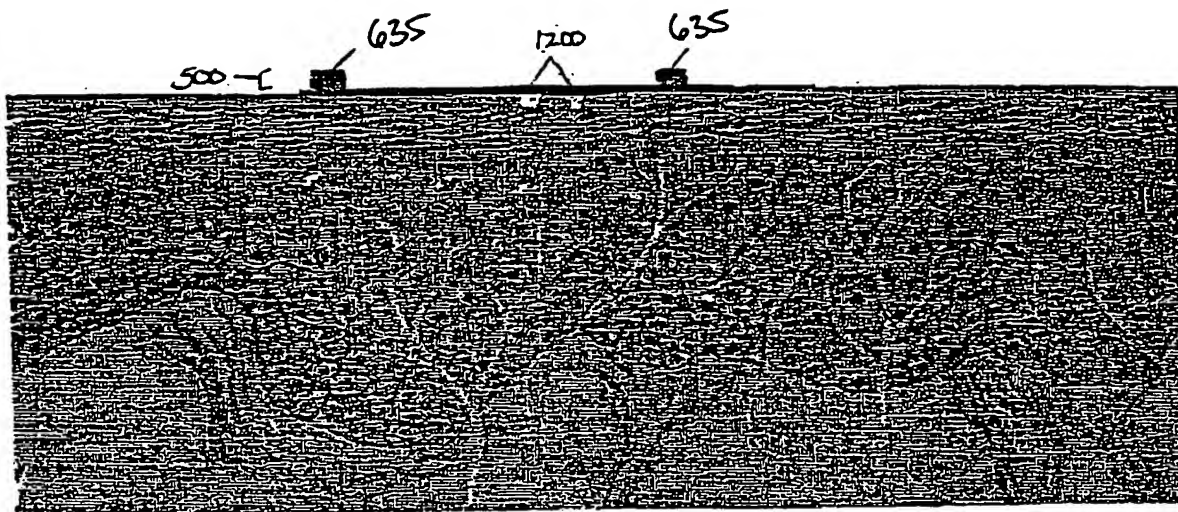


FIGURE 8D

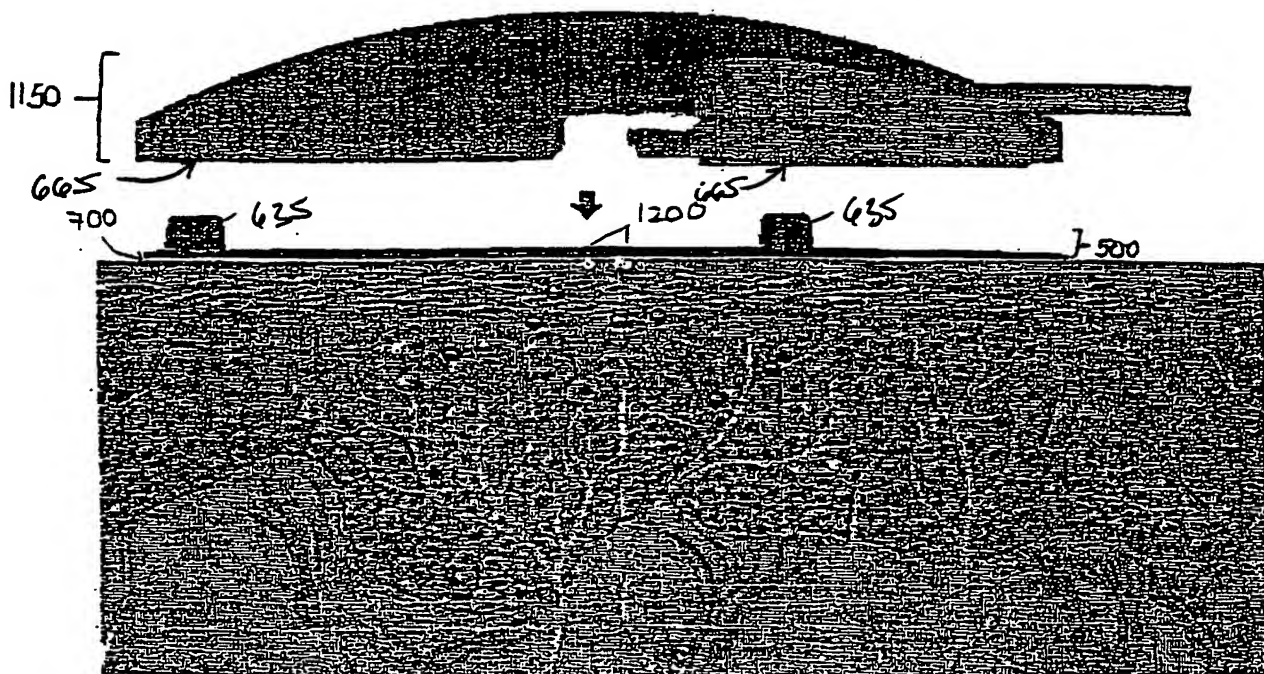


FIGURE 8E

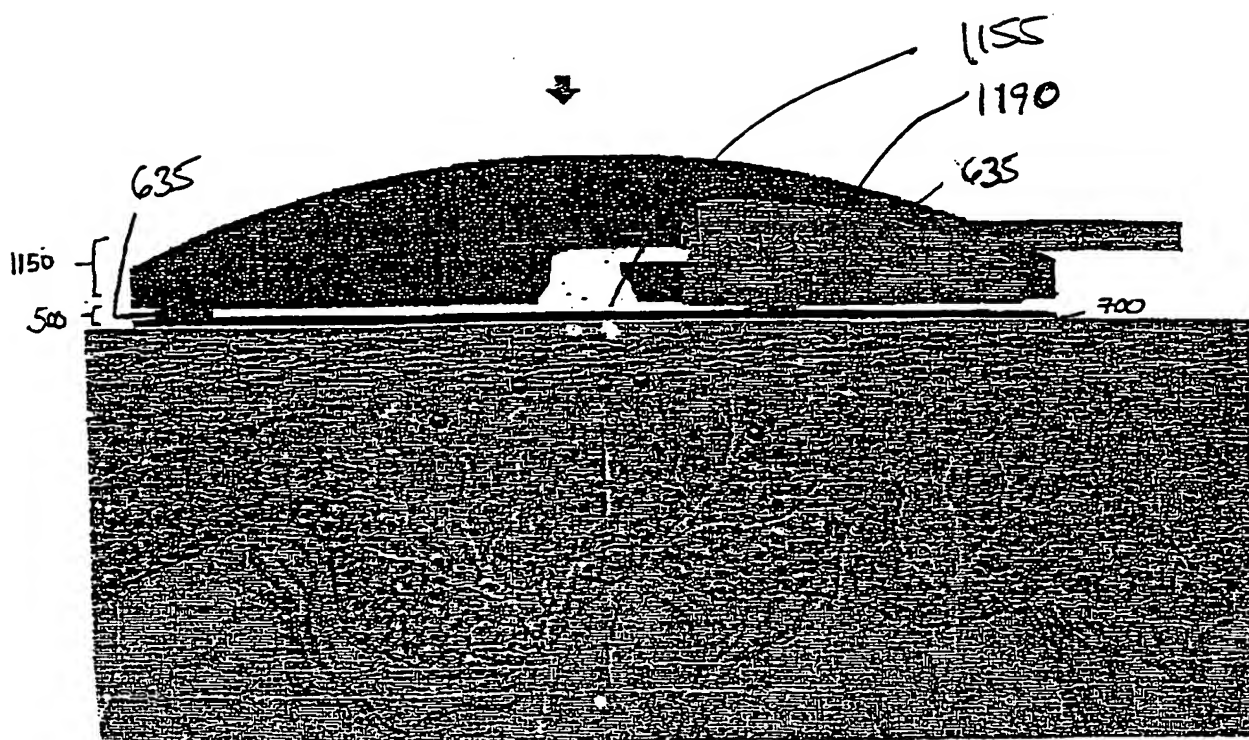
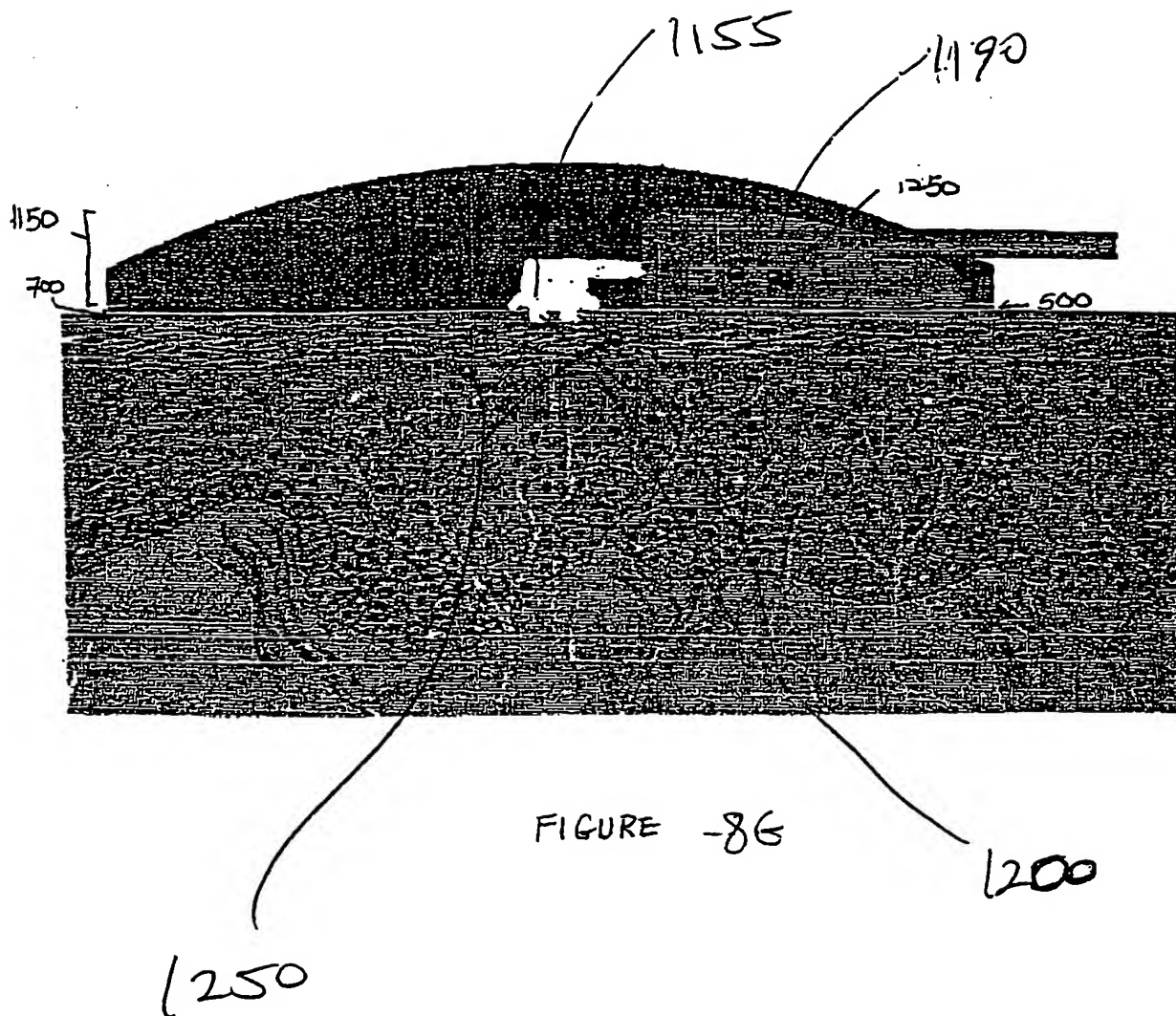


FIGURE 8F



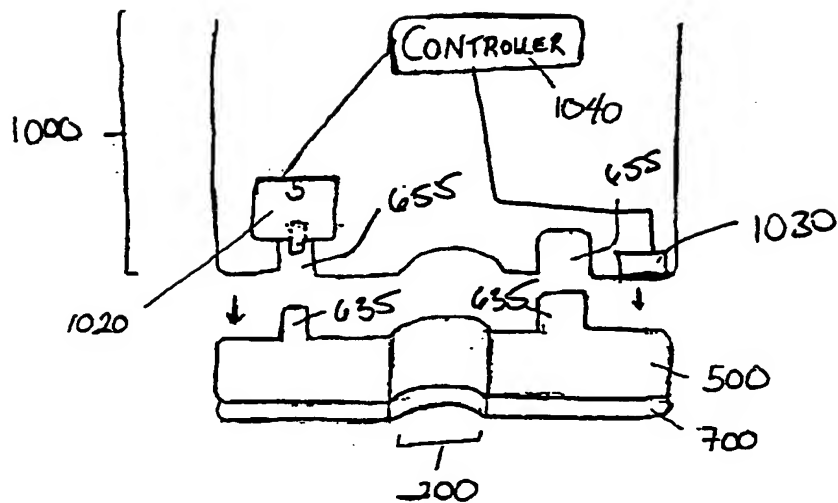


FIGURE 9

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/16064

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61B10/00 A61B19/00 A61B5/00 A61K41/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61B A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 274 418 A (VESTERAGER PETER K R ET AL) 23 June 1981 (1981-06-23)	1,13-16, 41
Y	column 3, line 56 -column 4, line 48; figures 4-6	2-5
Y	US 5 885 211 A (EPPSTEIN JONATHAN A ET AL) 23 March 1999 (1999-03-23) cited in the application column 15, line 6 - line 38 column 16, line 42 -column 17, line 50 column 32, line 54 -column 33, line 9; figures 1,3A,4,28 column 32, line 54 -column 33, line 9 column 41, line 28 - line 50; figure 28 -/--	2-5,22, 25-28, 31,42



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

10 January 2001

Date of mailing of the international search report

19.01.2001

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Moers, R

INTERNATIONAL SEARCH REPORT

Intel. Application No

PCT/US 00/16064

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 90 04354 A (HON EDWARD H ;HON EDWARD D (US); HON ROBERT W (US)) 3 May 1990 (1990-05-03) abstract; figures 1-5 ----	1,14-16
X	US 5 556 372 A (URGOVITCH KENNETH J ET AL) 17 September 1996 (1996-09-17) abstract; figure 2 column 7, line 6 - line 58; figures 2,13 ----	1,15, 17-20 42
Y		
X	US 5 879 373 A (BOECKER DIRK ET AL) 9 March 1999 (1999-03-09) column 8, line 41 - line 49; figure 1A ----	1,6-11
Y		12,22, 25-28,31
Y	US 4 112 941 A (LARIMORE FRANK C) 12 September 1978 (1978-09-12) column 3, line 63 -column 4, line 28; figure 3 ----	12
A	US 4 025 964 A (OWENS LESTER J) 31 May 1977 (1977-05-31) abstract; figure 1 ----	12
A	DE 198 24 036 A (ROCHE DIAGNOSTICS GMBH) 2 June 1999 (1999-06-02) column 3, line 15 - line 18 ----	12
X	WO 98 56293 A (MINIMED INC) 17 December 1998 (1998-12-17) page 7, paragraph 3 -page 8, paragraph 3 page 10, paragraph 2 -page 11, line 41; figures 1,2 -----	1,21,23, 24,29,30

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/16064

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 32-40
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-5 14-16 and 41

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus and further comprising an energy absorbing layer.

2. Claims: 1, 6-13

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus further comprising means (clip, male-female member, magnet, thread) for mating with a surface on the apparatus

3. Claims: 1, 17-20 and 42

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus and an energy emitter apparatus comprising an alignment member for mating with the tissue interface member

4. Claims: 1, 21, 22 and 23-31

An alignment device comprising a tissue interface member suitable for positioning on the tissue surface and mating with an apparatus and a tissue breaching device comprising an alignment member for mating with the tissue interface member

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/16064

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4274418 A	23-06-1981	DK 239876 A CH 616329 A DE 2724461 A	02-12-1977 31-03-1980 22-12-1977
US 5885211 A	23-03-1999	US 5458140 A US 5445611 A US 6142939 A AU 707065 B AU 6863196 A BR 9610012 A CA 2199002 A,C CN 1195276 A EP 0858285 A GB 2307414 A,B HK 1009321 A JP 11511360 T NO 980878 A WO 9707734 A US 5722397 A US 6018678 A	17-10-1995 29-08-1995 07-11-2000 01-07-1999 19-03-1997 21-12-1999 01-03-1997 07-10-1998 19-08-1998 28-05-1997 28-05-1999 05-10-1999 27-04-1998 06-03-1997 03-03-1998 25-01-2000
WO 9004354 A	03-05-1990	US 4947865 A AU 4484089 A CA 2000698 A EP 0439514 A JP 4501224 T	14-08-1990 14-05-1990 17-04-1990 07-08-1991 05-03-1992
US 5556372 A	17-09-1996	AU 717030 B AU 1883695 A CA 2212230 A CN 1175194 A EP 0809470 A FI 973331 A JP 8238284 A NZ 281871 A WO 9625112 A	16-03-2000 04-09-1996 22-08-1996 04-03-1998 03-12-1997 13-10-1997 17-09-1996 29-09-1999 22-08-1996
US 5879373 A	09-03-1999	DE 4446721 A DE 19522706 A EP 0722691 A JP 2807650 B JP 8215180 A	27-06-1996 02-01-1997 24-07-1996 08-10-1998 27-08-1996
US 4112941 A	12-09-1978	NONE	
US 4025964 A	31-05-1977	NONE	
DE 19824036 A	02-06-1999	AU 2155699 A WO 9927854 A EP 1032307 A	16-06-1999 10-06-1999 06-09-2000
WO 9856293 A	17-12-1998	US 5954643 A EP 0987982 A	21-09-1999 29-03-2000